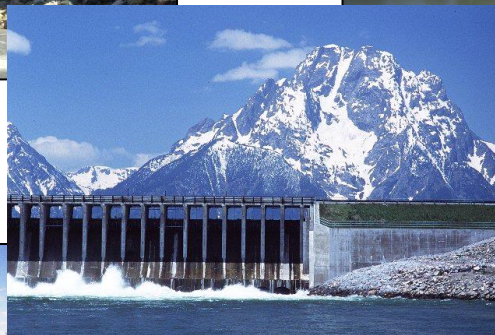




# **Advanced Hydrologic Prediction Service Quarterly Report 4<sup>th</sup> Quarter FY 2013**



**November 1, 2013**

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## **Innovation/Collaborative Research**

## **On-going Competitive and Collaborative Research**

(Grants and CREST)

**Theme:** Innovation

**Management Lead:**

**Objective:** Coordinate the evaluation and management of the collaborative grants program

### **Milestones**

Task	Due Date	Status
- None presently defined -		

### **Accomplishments/Actions**

#### **1<sup>st</sup> Quarter 2013**

- On December 12-13, the personnel from the Hydrologic Research Center and the Georgia Water Resources Institute provided a virtual workshop on a procedures and tools to effectively incorporate the influence of upstream river regulation on operational streamflow forecasts. These techniques were developed under an AHPS contract with the two organizations. Personnel from the River Forecast Centers (RFC), OHD, OCWWS/HSD, and region headquarters offices participated in the workshop. All materials are available at:  
<https://sites.google.com/a/noaa.gov/nws-best-practices/ohd/river-regulation-project>

(Note: Though not technically a grant, the approach was developed by HRC and GWRI under an earlier grant so it is reported here.)

#### **2<sup>nd</sup> Quarter 2013**

- Only one active grant – Boise State – on track.

#### **3<sup>rd</sup> Quarter 2013**

- Only one active grant – Boise State – on track – scheduled completion Aug. 31, 2013

#### **4<sup>th</sup> Quarter 2013**

- Still awaiting final report from Boise State

### **Problems Encountered/Issues**

**1<sup>st</sup> Quarter FY13** – None

**2<sup>nd</sup> Quarter FY13** – None

**3<sup>rd</sup> Quarter FY13** – None

**4<sup>th</sup> Quarter FY13** – None

## **Quantify Uncertainty (Ensembles)**

## HEFS Phase I Implementation

**Core Goal:** Quantify uncertainty of our forecast information

**Management Lead:** Jon Roe, Mark Fresch

**Objective:** Implement Phase 1 Hydrological Ensemble Forecast Service (HEFS) into the operational baseline. The operational ensemble functionality will be based on prototypes developed and tested in the eXperimental Ensemble Forecast System. The capabilities included in this first operational HEFS will be decided based on high-level requirements and concept of operations created by a team of scientists, software engineers, and RFC forecasters.

### Milestones

Task	Due Date	Status
HEFS Graphics Generator: Pass HOSIP Gate 2	FY10, Q2	Graphics Generator is being taken out of this project.
HEFS Graphics Generator: Pass OSIP combined Gate 1/2	FY10, Q2	Graphics Generator is being taken out of this project.
Complete the Phase 1 Graphics Generator Implementation	FY10, Q1	Completed March 2010
Complete the Phase 2 Graphics Generator Implementation	FY10, Q4	Graphics Generator is being taken out of this project.
Complete the HEFS high-level requirements and concept of operations	FY 11, Q2	Draft completed in FY11 Q2. A final version was sent to the NWS River Forecast Centers for comment.
Complete software development project plan for EPP3 and EnsPost	FY11, Q3	The project plan was completed in Q4.
Release HEFS Development Release 1 for Beta Testing	FY12, Q3	HEFS Development Release 1 started Beta Testing during FY12, Q3.
Release HEFS Development Release 2 for Beta Testing	FY12, Q4	HEFS Development Release 2 started Beta Testing in early FY13, Q1.
Release HEFS Development Release 3 for Beta Testing	FY13, Q2	HEFS Development Release 3 started a phased deployment in early March 2013, as scheduled
Release HEFS Version 1 release 1 for Beta Testing	FY14, Q1	HEFS Version 1 started Beta Testing in late FY13, Q4.

### Accomplishments/Actions

#### 1<sup>st</sup> Quarter FY12

- HEFS Development Release 1 software development and unit testing are on track for integration testing to start after January 2012. Here are some details on the HEFS components
  - Meteorological Ensemble Forecasting Processor (MEFP): Changes were made to ingest the CFSv2 as an option to the CFSv1, both long range numerical weather prediction models. In addition, a GUI, called the MEFP Parameter Estimator, was created to make parameter estimation (or calibration) easier and less time consuming.
  - Ensemble Post-processor (EnsPost): The prototype code was recoded in Java to improve maintainability. In addition, a GUI, called the EnsPost Parameter Estimator, was created to make parameter estimation (or calibration) more user-friendly
  - Ensemble Verification System (EVS): EVS was incorporated into the HEFS software package.
  - Graphics Generator: Some minor changes are being made to FEWS and Graphics Generator in order for Graphics Generator to work with the latest FEWS.

- Training – A 3-day workshop is being planned for the end of March. Similar training workshops will be provided prior to each release and be recorded and made available via NWS Learning Management System (LMS). A Basic Hydrologic Ensemble Theory model is being developed by OHD and the National Hydrologic and Geospatial Sciences Training Center.
- In order to prepare for the HEFS ensemble stream-flow forecasts, (non-HEFS) operational deterministic and climate-based ensemble stream-flow forecasts are being provided to NYCDEP. Some of the preliminary climate-based ESP hind-casts for NYCDEP (mentioned in the prior quarter) are being redone due to errors.

## **2<sup>nd</sup> Quarter FY12**

- HEFS Development Release 1 (software and documentation) is on track for release in early Q3 FY12 to the HEFS Test RFCs for Beta Testing. Support tracking tool (Fogbugz) has been adapted to include HEFS areas. During the Beta Test, the Test RFCs will be given a) several test procedures to run over the next several weeks and b) HEFS end-to-end configurations for real-time forecasts at two points. Subsequently, the Test RFCs will be expected to configure two more forecast points for end-to-end HEFS real-time forecasts.
- A 3-day HEFS Training Workshop was held at the end of March 2012 for representatives of the HEFS RFC Test Team. The workshop provided reviews of background information, including the Basic Hydrological Ensemble Theory model, demonstrations of the HEFS components, and exercises for the students to use the components.
- The climate-based ESP hindcasts for NYCDEP are about 70% complete.

## **3<sup>rd</sup> Quarter FY12**

- HEFS Development Release 1 (software and documentation) was completed for beta testing on May 1<sup>st</sup>.
  - Off-line, non-operational testing has uncovered only minor issues.
  - Development Release 1 provides new graphical user interfaces for calibrating MEFP and EnsPost. Also, MEFP can now make use of the latest version of the Climate Forecast System (CFSv2). The HEFS software reliability and usability has also been improved.
  - HEFS software testing now follows a thorough, structured process with detailed procedures.
  - HEFS is being beta tested at five RFCs until the end of calendar year 2013.
  - In April 2012, representatives from the five RFCs and key HEFS team members, collectively called the HEFS RFC Test Team, began meeting weekly to provide feedback on HEFS testing to OHD.
  - In addition to software, OHD provided the HEFS RFC Test Team with supporting documentation, including user's manuals for all HEFS components.
  - The NWS hydrology support group started supporting HEFS, including adding dedicated staff and tracking HEFS issues.
- Climate-based ensemble hindcasts are on-track to complete by the end of July 2012. MARFC and NERFC created the hindcasts, and, during the quarter, OHD has been checking these hindcasts against historical simulations. In late 2011, historical simulations were created by MARFC and NERFC and delivered to Riverside Technology, Inc., which is part of the OST development team. However, the historical simulations were recently redone by the RFCs when OHD's checks uncovered errors and these simulations will be redelivered with the climate-based hindcasts.
- OHD began work to make use of the Global Ensemble Forecast System (GEFS) output within MEFP. MEFP design changes were started which will enable MEFP to use GEFS in operations (due in spring 2013). In addition, OHD has created hindcasting configurations, which will eventually be used to produce GEFS-based hindcasts (due Sep. 2013). In May 2012, NOAA's Earth System Research Laboratory provided an archive of GEFS reforecasts needed for MEFP calibration. OHD is converting those GEFS reforecasts to a more usable format, and have converted the data for approximately 50% of the area covering the five HEFS test RFCs.
- OHD continues to evaluate HEFS (MEFP and EnsPost) performance for a variety of forcings and locations. Eventually, the GEFS-based hindcasts for OST will be created as a by-product of this effort. During the quarter, OHD started the evaluation of GFS-based and climatology-based performance at two locations within each of the five HEFS Test RFCs.
- In May, a project update briefing was provided to NWS hydrologists, and, in June, seminars of



HEFS components were briefed to the RFC Development and Operations Hydrologists.

#### **4<sup>th</sup> Quarter FY12**

- HEFS Development Release 1 – Beta Testing.
  - During the quarter, OHD tested HEFS in a real-time end-to-end (i.e. all components) environment and then provided those tests to the five HEFS RFCs. Three have completed their beta test for Dev. Rel. 1 and are running HEFS end-to-end daily for two forecast locations. One of the five RFCs is able to run HEFS end-to-end with minor issues. The final RFC has on-going hardware issues which are preventing any beta tests.
  - Representatives from the five RFCs and key HEFS team members continue to meet weekly to provide feedback on HEFS to OHD.
  - Support staff (NWS hydrology support group) and resources (such as issue tracking software) are now actively handling HEFS related issues.
- HEFS Development Release 2 is being prepared for release in mid-October for Beta Testing.
- At the end of July 2012, climate-based ensemble hindcasts and corrected historical simulations were completed for forecast locations within the NYC water supply, in support of the NYC Department of Environmental Protection. The hindcasts and historical simulations were created by MARFC and NERFC, checked by OHD, and provided to Riverside Technology, Inc. (part of the OST Team). The historical simulations were corrected from an earlier delivery.
- A second HEFS Training Workshop was held in September 2012 for representatives of the HEFS RFC Test Team, the NWS hydrology support group, and the NWS Training Center. The students learned how to add forecast points to HEFS and use Graphics Generator to view and adapt graphical output.
- OHD is on-track to make use of the new GEFS output within the MEFP, both operational (i.e. real-time) and hindcaster. For the operational MEFP, internal testing will continue until delivery with Development Release 3, planned for March 2013. For the MEFP hindcaster, OHD has nearly completed testing, and the hindcaster will be used within OHD for HEFS performance evaluation, starting in FY13 Q1. In addition, OHD has converted GEFS reforecasts to a more usable format for all the area covering the five HEFS test RFCs, including the NYC water supply system domain.
- OHD continues a multi-phase evaluation of HEFS performance for a variety of forcings and locations. During the quarter, OHD continued to evaluate GFS-based and climatology-based performance for eight locations across the CONUS. In addition, OHD partially automated and thereby shortened the hindcasting run process.
- OHD procured new computer systems for HEFS testing and operations at MARFC and NERFC to replace the older, unstable systems.

#### **1<sup>st</sup> Quarter FY13**

- HEFS Development Release 2 (software and documentation) was provided for beta testing on October 16<sup>th</sup> 2012.
  - As with Development Release 1, OHD tested this development release in a real-time end-to-end (i.e. all components) environment.
  - OHD provided customized installations to the five HEFS RFCs so that they can run HEFS in real-time for two forecast locations within their area of responsibility.
  - HEFS RFCs were tasked to add forecast locations; at the end of the quarter, four of five RFCs had added at least one more forecast location.
  - Representatives from the five RFCs and key HEFS team members continue to meet weekly to provide feedback on HEFS to OHD.
- OHD continues a multi-phase evaluation of HEFS performance for a variety of forcings and locations. During the quarter, OHD continued phase 1, to evaluate GFS-based and climatology-based performance for eight locations across the CONUS. The report on this phase of the evaluation will be ready at the end of February 2013. OHD further shortened the hindcasting run-time. The hindcaster is ready for the next phase (2) which uses the GEFS in MEFP.
- OHD is on-track for HEFS Development Release 3 which will include the use of GEFS in the real-time forecasts.
- New computer systems are being loaded and configured for HEFS testing at MARFC and NERFC.

#### **2<sup>nd</sup> Quarter FY13**

- HEFS Development Release 3, Phase 1 was provided for beta testing on March 7<sup>th</sup> 2013.
  - As with other releases, OHD tested this development release in a real-time end-to-end (i.e. all components) environment.
  - During the quarter, all HEFS Test RFCs had HEFS running in real-time at two or more forecast locations, including all locations within the NYC water supply.
  - Phase 2 of the release is on-track for beginning of April; this release will include the ability to use the GEFS.
  - A training workshop for the release is on-track for the end of April.
  - Representatives from the five RFCs and key HEFS team members continue to meet weekly to provide feedback on HEFS to OHD.
- OHD continues a multi-phase evaluation of HEFS performance for a variety of forcings and locations.
  - During the quarter, OHD completed Phase 1 of the HEFS Science Validation. In this phase, OHD evaluated GFS-based v. climatology-based performance with a 14-day forecast horizon for eight locations across the CONUS. The evaluation included creation of hindcasts over many years for those locations, and a draft report on this phase of the evaluation was completed.
  - For Phase 2, OHD created preliminary (non-QCed) hindcasts with GEFS, CFSv2, and climatology forcings with a 330-day forecast horizon for 24 locations within the NYC water supply.
- New computer systems were installed and configured for HEFS at MARFC and NERFC.

### **3<sup>rd</sup> Quarter FY13**

- HEFS Development Release 3, Phase 2 was provided for beta testing in April 2013 to the five (5) HEFS Test RFCs. Key features of this release are the ability to ingest the new and improved Global Ensemble Forecast System (GEFS) and a more flexible and maintainable version of the Meteorological Ensemble Forecast Processor (MEFP).
  - As with other releases, OHD tested this development release in a real-time end-to-end (i.e. all components) environment.
  - During the quarter, the HEFS Test RFCs started to configure and use the build to varying degrees to produce real-time daily HEFS forecasts.
    - NERFC and MARFC are planning to complete the transition to the new build in July 2013 in order to produce forecasts for 22 forecast locations within the NYC water supply.
    - CNRFC is producing real-time forecasts with the latest build for approximately 150 locations
    - ABRFC and CBRFC are producing real-time forecasts with the latest build for approximately 12 locations.
  - A training workshop on the release was held at the end of April for members of the HEFS RFC Test Team and NWS hydrology support staff.
  - Representatives from the five RFCs and key HEFS team members continue to meet regularly to provide feedback on HEFS to OHD.
- OHD continues a multi-phase science evaluation of HEFS performance for a variety of forcings and locations.
  - During the quarter, OHD completed the final report for Phase 1 of the HEFS science evaluation. In that phase, OHD evaluated GFS-based v. climatology-based performance with a 14-day forecast horizon for eight locations across the CONUS.
  - For Phase 2, OHD continues to quality control the hindcasts which have GEFS, CFSv2, and climatology forcings with a 330-day forecast horizon for locations within the NYC water supply. This phase is due to complete in September 2013. In addition, the resulting hindcasts will be provided to NYC Department of Environmental Protection for their use in managing the NYC water supply.
  - OHD also started a Phase 3, in which HEFS skill will be compared using the GEFS v. GFS over a 14-day forecast horizon.
- During the quarter, OHD began work on the final major HEFS build during this phase of the project, HEFSv1, planned for late September 2013. This build will contain more functionality (data quality controls and diagnostics) for parameter estimation which will allow the user to better optimize HEFS calibration and will also contain several fixes to key issues.

#### **4<sup>th</sup> Quarter FY13**

- The five (5) HEFS Test RFCs expanded their use of HEFS Development Release 3, Phase 2 (HEFS-0.3.2) to varying degrees to produce real-time daily HEFS forecasts.
  - NERFC and MARFC are creating HEFS forecasts for 22 forecasts locations within the NYC water supply. MARFC is also creating HEFS forecasts for internal use at all points on the Delaware River.
  - CNRFC is producing HEFS forecasts on their operational CHPS for approximately 150 locations
  - ABRFC is producing HEFS forecasts with the latest build for approximately 20 forecast points (or 50 segments).
  - CBRFC is producing HEFS forecasts on their operational CHPS for all points above L. Powell which is approximately 240 points.
- OHD also conducted a training workshop on the release in September for members of the HEFS Test RFCs and NWS hydrology support staff.
- OHD continues a multi-phase science evaluation of HEFS performance for a variety of forcings and locations.
  - During the quarter, OHD completed an evaluation and draft report of the Phase 2 of the HEFS science evaluation. In that phase, OHD evaluated long-range HEFS forecasts v. climatology-based performance for locations within the NYC water supply. As part of this effort, the resulting hindcasts were provided to NYC Department of Environmental Protection for their use in managing the NYC water supply.
  - OHD also continued work on Phase 3, in which HEFS skill will be compared using the GEFS v. GFS over a 14-day forecast horizon. This phase is due to complete by the end of Dec. 2013.
- Representatives from the five RFCs and key HEFS team members continue to meet regularly to provide feedback to OHD.

### **Problems Encountered/Issues**

#### **1<sup>st</sup> Quarter FY12**

- Re-forecasts of the new GEFS have been delayed. This will cause a delay (amount TBD) in the MEFP recoding and inclusion of GEFS as an input to MEFP currently targeted for HEFS Development Release 2. When GEFS is added as an input to the MEFP, the re-forecasts are needed by the MEFP Parameter Estimator and for hind-casting.
- Creation of hind-casts within CHPS is taking much longer than anticipated. As a result, some future HEFS tasks may need to be delayed or re-thought in order to accomplish the hind-casting for NYCDEP.

#### **2<sup>nd</sup> Quarter FY12**

- The system being used for HEFS testing is also being used for AWIPS 2 testing
- Due to budget constraints, some tasks have been cut or deferred.

#### **3<sup>rd</sup> Quarter FY12**

- The test systems at two RFCs have been unstable causing disruptions to HEFS field testing and using up support staff and spare equipment. In response, OHD will procure new test systems at those RFCs.
- Hindcasts and historical simulations were difficult and time-consuming to produce. Because of the extended processing times, the large amount (50 yrs.) of data used needed to be broken up into manageable time periods; this made the process prone to errors. Forecast staff at NERFC and MARFC created these data, although this task was a secondary to their forecast duties. In addition, when the task to create these data was started (Fall 2011), they had little experience creating long hindcasts or historical simulations on a newly deployed hydrologic forecasting system. To alleviate these issues, GEFS-based hindcasts will be created by OHD staff dedicated to the task and have lots of hindcasting experience on a faster processor with additional storage. In addition, at OHD's request, Deltares provided a faster CHPS workflow which reduced run times

by 67-80%.

- Delivery of the GEFS reforecasts to OHD was delayed by 6 months. As a result, modifying MEFP to use GEFS had to be delayed from Development Release 2 to Development Release 3 (due Spring 2013). OHD will modify the MEFP hindcast version to use GEFS in time to generate the GEFS-based hindcasts by September 2013.

#### **4<sup>th</sup> Quarter FY12**

- An error was found in the HEFS Meteorological Ensemble Forecast Processor (MEFP) which results in erroneous temperature forcings forecasts when CFS is used; a patch to MEFP is planned in the coming weeks.
- Beta testing was delayed at CBRFC, NERFC and MARFC. CBRFC was unable to do much beta testing of real-time HEFS due to computer issues unrelated to HEFS. NERFC and MARFC had procedural issues setting up Graphics Generator and connecting to the parent system, the Community Hydrologic Prediction System (CHPS).
- Climate-based hindcasts were not done at three locations requested by NYCDEP. Two of those locations are not yet operational at NERFC and, as a result, have not been set-up. However, NERFC will soon be adding those locations to their operational runs and has agreed to create the climate-based hindcasts and eventually HEFS forecasts for those points. For the third location, that location is not a NWS forecast location, and Riverside Technology, Inc. has since advised to switch to a nearby location.
- For the evaluation of HEFS performance, two locations of the original ten locations (both within the NERFC area of responsibility) were dropped from this phase of the evaluation due to missing observed data. This will not impact the future delivery of HEFS hindcasts with GEFS.
- Data inconsistencies delayed HEFS performance evaluation by several weeks. The delay will be made up by additional staff and improved hindcast run-times.
- Plans to connect HEFS to the RFC Archive are on-hold until the RFC Archive project is underway.

#### **1<sup>st</sup> Quarter FY13**

- Phase 1 of the HEFS science evaluation was delayed due to technical issues related to CHPS configurations. Due to the length of the delays, future phases were re-ordered so that the evaluation of the GEFS-based long range HEFS forecasts will be done next (Phase 2). The hindcasts produced for that phase (2) will be provided to the NYCDEP.

#### **2<sup>nd</sup> Quarter FY13**

- Technical issues remain unsolved for the HEFS Science Validation. However, it was determined that those issues were not significant to further delay Phase 2 of the Science Validation. The issues will be investigated further after the HEFS Training Workshop at the end of April.

#### **3<sup>rd</sup> Quarter FY13**

- During the quarter, installation (configuration and calibration) of the latest build at MARFC and NERFC's progress was delayed for two reasons. There was flooding at those RFCs which temporarily distracted staff from HEFS efforts, and progress on HEFS was purposely slowed while technical details of the forecasts were reviewed by NWS and the OST Team (Riverside).
- One of the issues found in the previous quarter involved inconsistencies in the HEFS temperature forecasts. The latest set of HEFS hindcasts for Phase science evaluation and for NYC contains a change to mitigate those inconsistencies. The inconsistencies were discontinuities in the time series, and the mitigating change was to remove the modulation canonical events from MEFP.
- Below are other HEFS issues for the quarter. OHD continues to investigate the first three issues, but the issues will likely not be fixed before the end of 2013. For issue #4, OHD has arranged with the NWS National Center for Environmental Prediction (NCEP) to provide an automated notification method for HEFS to start its daily run. For issue #5, OHD has improved (decreased) run-time from 3 hours to 1 hour for CNRFC at ~150 locations. OHD corrected issue #6; it was due to a software error.
  1. Probability of small amounts of precipitation are under-forecasted
  2. GEFS skill not always being preserved in MEFP
  3. Long-range CFSv2 forecasts have low skill

4. CFSv2 forecasts from NCEP are sometimes late
5. HEFS forecast were running slow
6. HEFS GEFS-based operational temperature forecasts were poor

#### **4<sup>th</sup> Quarter FY13**

- During the quarter, OHD resolved issue #2 from the 3<sup>rd</sup> Quarter FY13, GEFS skill not always being preserved in MEFP.
- EnsPost skill at long-range is low and needs systematic investigation.
- EnsPost adjustments across different seasons can cause an unrealistic change in the magnitude of the forecast.
- HEFS skill at regulated (e.g. reservoirs) locations needs evaluation.

## **Gridded Water Resources**

## Auto Calibration for Distributed Model

**Core Goal:** Provide, then improve, gridded water resource data production capability

**Management Lead:** Mike Smith

**Objective:** The objectives of this work include developing tools and procedures for auto-calibrating the HL-RDHM. Two phases are identified for this area of research. First, initial work will focus on auto-optimization of the scalar multipliers of all the gridded parameters (SAC, Snow-17, and routing) so that all parameters are adjusted uniformly. This was done manually in DMIP 1 with good success. A prerequisite for this work is the development of sound lumped hourly parameters. Second, future funding will support work to optimize individual gridded parameters for groups of grids.

### Milestones

Task	Due Date	Status
1. Investigated separate procedures for elevation zones for mountainous areas.	TBD	On hold
2. Develop outline for overall strategy for distributed model calibration	TBD	On hold
3. Develop approach for auto calibration of elevation zone parameters; parameter limits, and routing model parameters	TBD	Delayed to put HL-RDHM components into FEWS

### Accomplishments/Actions

#### 1<sup>st</sup> Quarter FY12

- Continued assistance provided to HSEB on implementing OPT 3.

#### 2<sup>nd</sup> Quarter FY12

- Assisted CHPS Calibration Team with developing requirements for basic calibration capability.
- Penn. State U. beginning large experiments with calibrating HL-RDHM on supercomputer (no cost to OHD). Such tests could help inform the development of automatic calibration strategies for HL-RDHM in CHPS

#### 3<sup>rd</sup> Quarter FY12

- No work this period

#### 4<sup>th</sup> Quarter FY12

- No work this period

#### 1<sup>st</sup> Quarter FY13

- Continued assistance provided to HSEB and Deltares to develop a basic CHPS calibration tool similar to the Interactive Calibration Program (ICP).

#### 2nd Quarter FY13

- Continued assistance provided to HSEB and Deltares to develop a basic CHPS calibration tool similar to the Interactive Calibration Program (ICP). This exercise lays the groundwork for the more complex task of implementing automatic optimization in CHPS.

#### 3rd Quarter FY13

- Continued assistance provided to HSEB and Deltares to develop a basic CHPS calibration tool similar to the Interactive Calibration Program (ICP). This exercise lays the groundwork for the more complex task of implementing automatic optimization in CHPS.

#### 4th Quarter FY13

- Continued assistance provided to HSEB and Deltares to develop a basic CHPS calibration tool similar to the Interactive Calibration Program (ICP). This exercise lays the groundwork for the more complex task of implementing automatic optimization in CHPS.

### **Problems Encountered/Issues**

#### **1<sup>st</sup> Quarter FY12**

- Some delays noted due to other CHPS priorities.

#### **2<sup>nd</sup> Quarter FY12**

- None this quarter

#### **3<sup>rd</sup> Quarter FY12**

- None this quarter

#### **4<sup>th</sup> Quarter FY12**

- None this period

#### **1<sup>st</sup> Quarter FY13**

- No funding available to develop further CHPS calibration tools beyond ICP. As a result, the non-CHPS version of HL-RDHM will need to be maintained.

#### **2nd Quarter FY13**

- No funding available to develop further CHPS calibration tools beyond ICP. As a result, the non-CHPS version of HL-RDHM will need to be maintained

#### **3rd Quarter FY13**

- No funding available to develop further CHPS calibration tools beyond ICP. As a result, the non-CHPS version of HL-RDHM will need to be maintained

#### **4th Quarter FY13**

- CHPS cannot replicate the ICP percolation analysis function. A crude work-around was designed that calls for the use of paper copies of the percolation curve.



## Distributed Model Intercomparison Project (DMIP II)

**Core Goal:** Provide, then improve, gridded water resource data production capability

**Management Lead:** Mike Smith

**Objective:** Develop then Refine Gridded Water Resources Products.

### Milestones

Task	Due Date	Status
1. Complete analysis of simulations from the Oklahoma experiments	FY-10 Q4	Completed
2. Submit Oklahoma basin papers for DMIP 2 Special Issue	FY10 Q3	Completed
3. Design OK forecast mode experiment (this experiment postponed)	FY09 Q1	withdrawn
4. DMIP 2 Western Basin Experiments: generate and analyze basic (w/o HMT data) distributed and lumped simulations	FY10 Q4	Complete
5. Finalize the 'basic' (non-HMT) gridded QPE and QTE data and make available to DMIP 2 participants.	FY10 Q2	Complete
6. Complete analyses of participants' western basin 'basic' simulations.	FY10 Q4	Interim analysis of submitted simulations completed
7. (Jointly with Hydrometeorology Group) Support ESRL and NSSL in the derivation and evaluation of the HMT products for DMIP 2.	FY10 Q4	Completed
8. Deliver to DMIP 2 the HMT advanced data for 2005-2006 with new modeling instructions.	FY10 Q4	Withdrawn as DMIP 2 is officially over
9. OHD support for DMIP 2 participants	FY10 Q4	Complete
10. Submit overview and results papers for DMIP 2 Western Basin experiments	FY-11 Q4	Completed
11. Develop and deliver recommendations on the use of biased and inconsistent precipitation data	FY10 Q4	Completed

### Accomplishments/Actions

#### 1st Quarter FY12

- Paper by Hydrology Group on the analysis of gridded historical QPE was accepted for publication in the Journal of Hydrology
- DMIP 2 Special Issue of the Journal of Hydrology finalized; Editorial staff announced that it would be published in Feb, 2012.
- Draft paper by ESRL and OHD on the use of HMT West radar derived snow level height completed and approved by CNRFC.

#### 2<sup>nd</sup> Quarter FY12

- DMIP 2 Special issue of the Journal of Hydrology (Oklahoma experiments) published in February.
- Paper by ESRL and OHD on the use of HMT West radar-derived snow level height submitted to the Journal of Hydrometeorology
- DMIP 2 western basin results paper sent out to participants for review.

#### 3rd Quarter FY12

- Final revisions made to western basin results paper

**4<sup>th</sup> Quarter FY12**

- Combined DMIP 2 West introduction and results papers into one manuscript
- Obtained permission from Journal Hydrology Chief Editor to submit a longer-than-usual paper for DMIP 2 West
- Combined DMIP 2 West paper submitted to OHD review August 18, 2012 and approved in October for submission to Journal.

**1st Quarter FY13**

- Revised paper on use of HMT-West radar derived snow level per Journal of Hydrometeorology reviewer's comments
- Submitted DMIP 2 West paper to Journal of Hydrology for review.

**2<sup>nd</sup> Quarter FY13**

- Revised paper on use of HMT-West radar derived snow level accepted for publication by Journal of Hydrometeorology
- Revised the DMIP 2 West paper per comments from Journal of Hydrology. Submitted revised version March 19.

**3rd Quarter FY13**

- Waiting on J. Hydrology to provide comments on revised DMIP 2 West results paper

**4th Quarter FY13**

- DMIP 2 West paper accepted for publication August 28, 2013. Editor's proof was revised for final publication in the Journal of Hydrology. Project is now completed.

**Problems Encountered/Issues****1st Quarter FY12**

- Naoki Mizukami left OHD to take a Post-Doctoral position at NCAR in Boulder, CO.

**2nd Quarter FY12**

- None

**3rd Quarter FY12**

- Work on results paper delayed to focus on IWRSS prototype CONUS runs of SAC-HTET

**4th Quarter FY12**

- Delays getting final reviews by European co-authors and OHD.

**1st Quarter FY13**

- None

**2nd Quarter FY13**

- None

**3rd Quarter FY13**

- None

**4<sup>th</sup> Quarter FY13**

- None

## Support Distributed Model Implementation

**Core Goal:** Provide, then improve, gridded water resource data production capability

**Management Lead:** Mike Smith

**Objective:** Provide training and support to RFCs as necessary to support implementation for river, flash flood, and new product forecasting.

### Milestones

Task	Due Date	Status
1. Provide training and support to RFCs as necessary to support implementation for river, flash flood, and new product forecasting.	Ongoing	

### Accomplishments/Actions

#### 1<sup>st</sup> Quarter FY12

- Provided guidance to APRFC and HAWAII WFO on QPE derivation and modeling scale issues for DHM-TF issues in Hawaii.
- Developed historical gridded temperature preprocessor (Hydrometeorology Group).

#### 2<sup>nd</sup> Quarter FY12

- Hydrology Group provided guidance to LMRFC as they began implementation of DHM-TF over their domain.
- Hydrology Group supported APRFC efforts to implement DHM-TF in Hawaii.

#### 3rd Quarter FY12

- APRFC and Hawaii WFO successfully generated historical 1-km QPE and 1-km HL-RDHM connectivity for DHM-TF in Hawaii. Resolved HRAP projection issues.
- Continued Support to LMRFC as they began implementation of DHM-TF over their domain.
- Provided gridded air temperature data to ABRFC for tests of Snow-17 in their western mountainous basins.

#### 4th Quarter FY12

- Stand-alone HL-RDHM running operationally for about 1 month at Hawaii WFO: 6 forecast points and TF for Kauai. Importing and displaying results in CHPS. Considering how to add QPF
- Continued support for LMRFC in the implementation of HL-RDHM over their domain for DHM-TF.

#### 1<sup>st</sup> Quarter FY13

- Continued support of LMRFC in the development of DHM-TF over their entire domain
- Continued support of Hawaii WFO and APRFC in the runs of DHM-TF
- Began assisting NCRFC with implementation of HL-RDHM.

#### 2<sup>nd</sup> Quarter FY13

- Continued support of LMRFC in the development of DHM-TF over their entire domain. Good results seen in several cases, verified by on-the-ground observers. LMRFC providing results to WFOs for review and comment.
- Continued support of Hawaii WFO and APRFC in the runs of DHM-TF. Model is running at 1-km spatial resolution.
- Continued to assist NCRFC with implementation of HL-RDHM and SAC-HTET for the Red River of the North flooding. Worked with RFC to discuss options. Provided model states for start-up, parameters, HL-RDHM input file, and scripts to generate max-min temperature data.

**3rd Quarter FY13**

- Continued Support to LMRFC as they began implementation of DHM-TF over their domain.
- Provided support to MBRFC as they began implementation of DHM-TF
- Provided support to NCRFC with spinning-up HL-RDHM and SAC-HTET for frozen ground modeling. In retrospective tests, SAC-HTET simulated the thawing of frozen soil within ~1 day of the observed time.

**4th Quarter FY13**

- Continued support to LMRFC as they implement DHM-TF over their domain, with good results seen in several cases. .
- Provided review and recommendations to MBRFC as they began implementation of HL-RDHM.
- Provided updates of HL-RDHM to NCRFC etc.

**Problems Encountered/Issues****1<sup>st</sup> Quarter FY12**

- Don Laurine (NWRFC DOH) retired. NWRFC project efforts put on hold until new DOH is hired.
- Suitability of HRAP projection for Hawaii is unclear.

**2<sup>nd</sup> Quarter FY12**

- Suitability of HRAP projection for Hawaii is unclear.

**3rd Quarter FY12**

- None

**4th Quarter FY12**

- None

**1<sup>st</sup> Quarter FY13**

- None

**2<sup>nd</sup> Quarter FY13**

- Discovered and corrected shift in sub-HRAP cells when running 4-km precipitation but ¼ HRAP resolution.
- Discovered and resolved flow direction issue in LMRFC domain where the Red River is joined to the Mississippi River via a canal. Discussed issue with Dave Welch.

**3rd Quarter FY13**

- Lack of full time software engineering assistance hampers support efforts for the RFCs.

**4th Quarter FY 2013**

- Lack of full time software engineering assistance hampers support efforts for the RFCs

## Migration of HL-RDHM Components to CHPS

**Core Goal:** Provide, then improve, gridded water resource data production capability

**Management Lead:** Mike Smith

**Objective:** This proposal covers work to implement the basic HL-RDHM components into the CHPS/FEWS architecture. Work began in FY-09 but funding did not begin until FY-10. It includes the science development, implementation, and testing of the SAC-HTET into CHPS. This project includes elements previously listed under the AHPS Project “Physically-based Modifications to the SAC-SMA”.

**Milestones:**

Major Task	Due Date	Status
2. Performance testing; prepare for and conduct Gate 4: Basic HL-RDHM components in CHPS.	FY11 Q1	Complete except for Gate 4
3. Implement SAC-HTET into CHPS HL-RDHM: including derivation of soil texture parameters; analysis/evaluation of Noah parametric data extension of SAC-HTET during and specifically after HL-RDHM software modification	FY11 Q4	Completed
4. RFC testing of CHPS HL-RDHM	FY11 Q3	On track Delayed due to RFCs' focus on BOC CHPS implementation
5. Submit a journal article describing the change in the evapotranspiration processes of SAC-HT	FY11 Q4	Completed; Submitted SAC-HT and SAC-HTET papers to Journal Hydrology Sept 28.

### Accomplishments/Actions

#### 1<sup>st</sup> Quarter FY12

- Experimental CONUS runs of SAC-HTET begun at NOHRSC. Resolved issues that arose as part of ‘operationalizing’ the SAC-HTET. Examples include identifying and correcting erroneous temperature and parametric data.
- Worked with EMC to extend the NLDAS 30-year re-analysis over CONUS to generate initial conditions for Jan 1, 2012 start of ‘live’ runs at NOHRSC of SAC-HTET

#### 2<sup>nd</sup> Quarter FY12

- Successfully executed SAC-HTET over CONUS for period spanning 9/2009-6/2010 at 4-km hourly scale. SAC-HTET was run at NOHRSC and saved states and restarted every 6 hours
- Gained ability in HSMB to run CONUS 4-km hourly executions of HL-RDHM and SAC-HTET on Imac machines, greatly enhancing the diagnosis of any issues.

#### 3rd Quarter FY12

- Began ‘live’ runs of SAC-HTET over CONUS, running on NOHRSC machines and generating prototype products for the IWRSS National Water Center. Data files and CONUS images posted on NOHRSC web page and FTP sites.
- SAC-HTET and SAC-HT companion journal papers revised and near completion.
- Began developing strategy to have SAC-HTET supported as a CHPS component
- Finalized Technical Readiness Level assessment of CONUS implementations of SAC-HTET

#### 4<sup>th</sup> Quarter FY12

- SAC-HTET and SAC-HT companion journal papers submitted to Journal of Hydrology.
- Developed routine similar to NWSRFS Carry-over transfer (COX) to adjust SAC-HTET states

when using new set of parameters.

- Corrected the problems with greenness fraction data along west coast.
- Completed 'TRL' document of CONUS SAC-HTET evaluation and presented to Don Cline July 9.
- Worked to merge stand-alone HL-RDHM components into CHPS version of HL-RDHM. These include the ability to use soil texture information directly, and the 'COX' routine above. Final testing needed of the soil texture component.
- Continued to support LMRFC implementation of SAC-HTET and HL-RDHM to support DHM-TF

#### **1<sup>st</sup> Quarter FY13**

- Continued merging (into CHPS) of HL-RDHM advances from the CONUS SAC-HTET activity.

#### **2<sup>nd</sup> Quarter FY13**

- CONUS SAC-HTET evaluation in OHRFC, SERFC, and NCRFC domains (~ 50 basins in each) showed good streamflow simulation results. Tests involved routing the SAC-HTET runoff to USGS gages. Precipitation from three sources was used: NLDAS, RUC/RRM, and RFC MPE. Results showed that the RUC/RRM precipitation has a high bias.

#### **3<sup>rd</sup> Quarter FY13**

- Revised SAC-HT paper according to comments from Journal of Hydrology. Submitted revised paper to the journal.

#### **4<sup>th</sup> Quarter FY13**

- HL-RDHM designated to become part of regular CHPS release package. Work begun to update adapters, write documentation, test plan etc.

### **Problems Encountered/Issues**

#### **1<sup>st</sup> Quarter FY12**

- Continued very long Linux run times delaying the development and testing of the gridded SAC-HTET

#### **2<sup>nd</sup> Quarter FY12**

- SAC-HTET paper being finalized but delayed due to NASA proposal review
- Some issues with CONUS initial states from EMC on Jan 2012 needed to be resolved such as large snow water equivalent values.

#### **3<sup>rd</sup> Quarter FY12**

- For CONUS SAC-HTET runs, resolved issues with parameters along coasts, generation of daily max min temperatures, mismatch of modeling domains, etc.

#### **4<sup>th</sup> Quarter FY12**

- None

#### **1<sup>st</sup> Quarter FY13**

- Journal review of SAC-HT and SAC-HTET papers took longer than 3 months.

#### **2<sup>nd</sup> Quarter FY13**

- HL-RDHM CHPS adapter was not updated along with other CHPS and FEWS code changes; OHRFC unable to try implementation of CHPS HL-RDHM.
- J. Hydrology review of SAC-HT paper took six months.

#### **3<sup>rd</sup> Quarter FY13**

- Very little work on HL-RDHM and CHPS integration due to limited OHD software engineering resources.

**4<sup>th</sup> Quarter FY13**

- The SLS autocalibration routine for HL-RDHM is not available in CHPS. As a result, the legacy HL-RDHM needs to be retained.

## **Inundation Mapping**



## Static Flood Inundation Maps Web-Page Development and Deployment

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**Core Goal:** Improve Flood Forecast Inundation Maps – Static Maps

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**Management Lead:** Victor Hom

**Objectives:**

- 1) Develop AHPS Flood Inundation Mapping (FIM) web page interface,
- 2) Deploy flood inundation maps in a nationally consistent, scientifically sound, and objective manner, and
- 3) Implement program elements to assure quality deliverables and maintenance of viability.

**Team Members:**

Laurie Hogan – Eastern Region  
Victor Hom – Office of Climate Water and Weather Services / HSD  
Kris Lander – Central Region  
Doug Marcy – National Ocean Service / Coastal Services Center  
Mike Schaffner - Western Region  
Wendy Pearson – Central Region  
Katelyn Costanza – Southern Region

This AHPS Core Goals team has been in operations since Q4 of FY07.

In FY13, an ad-hoc NOAA FIM Advisory team was commissioned to review drafts and provide input to the IWRSS FIM requirements document. The Advisory team included the FIM Core Goals team members joined by Hassan Mashriqui (OHD) and Celine Van Breukelen (APRFC).

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### **I. FY13 Main Objectives and Task Areas**

**Main FY13 Objectives:**

- (1) Update AHPS Flood Mapping Web Portal and Display
- (2) Provide webinar sessions on AHPS FIM to field offices.
- (3) Implement, via the AHPS web portal, additional flood inundation mapping libraries and provide assistance to the regions for development/implementation of other AHPS flood inundation mapping.

Prioritized Task Areas	Responsible Organization
1. AHPS Flood Mapping Web Portal and Display	NOAA NWS and NOAA CSC
2. Quality Assurance and Consistency of Regional Flood Maps	NOAA NWS and NOAA CSC
3. National Flood Inundation Mapping Guidelines and Program Standards	NOAA NWS, NOAA CSC, and Federal Partners
4. Regional Flood Mapping Development	NOAA NWS, NOAA CSC, FEMA, USGS, USACE, and local Partnerships
5. Maintenance and Servicing Maps	NOAA NWS and NOAA CSC

## II. FY13 Milestones

Task Area #1 - AHPS Flood Mapping Web Portal and Display		
Subtask 13-1.1 AHPS Web Portal for Levees and Flood Risk Areas	Due Date	Status
NWS is to coordinate with FEMA and USACE to understand the Levee Analysis and Mapping Approach for Accredited and Non-Accredited Levee and develop NWS guidance on how to show the flood risk behind federally certified and uncertified flood levees.	FY13Q3	Completed
NWS is to provide guidance on the display of flood risk behind federally certified and uncertified flood levees to Orion and enhance AHPS Web.	FY13Q4	Completed and plan implementation for FY14 libraries
Subtask 13-1.2 Provide more geospatial intelligence to NWS AHPS Products	Due Date	Status
Expand AHPS Flood Mapping Capabilities to include a broader availability of FEMA RiskMAP data through AHPS and gain better understanding of the extent of flooding upstream and downstream of the AHPS forecast point.	FY14Q2	On track - tested and evaluated

Task Area #2 Quality Assurance and Consistency of Regional Flood Maps		
Subtask 13-2.1 Quality Assurance and Phase 2 Quality Control Training Workshop (FIM12-2)	Due Date	Status
Work with CSC on Logistics for Webinar and Workshop	-	Completed
Conduct Flood Mapping Webinars	FY13Q3	Moved to FY13Q3 in proximity of the workshop to ensure webinar materials are fresh and relevant to workshop participants
Conduct QAQC Hands-on Workshop	FY13Q3	The decision to provide travel funding to this training was deferred until FY13Q3.

Task Area #3 - National Flood Inundation Mapping Guidelines and Program Standards		
Subtask 13-3.1 Concept of Operations and Requirements for National Flood Inundation Mapping Services	Due Date	Status
Develop <b>Concept of Operations and Requirements Document</b> for a National Flood Inundation Mapping Services per (a) Memorandum of Understanding (MOU) " <i>Collaborative Science Services and Tools to Support Integrated and Adaptive Water Resources Management</i> " with NWS, USACE, and USGS and (b) Charter for National Flood Inundation Mapping Requirements Team.	FY13Q4	Completed.
Subtask 13-3.2 Federal Guidelines and Statement of Work Templates (FIM08-2P)	Due Date	Status
Update Federal Guidelines to V.3	-	Completed. Next update is dependent on when there are substantial changes and resources become available.
Update SOW and QAQC Guidance	-	Completed.
Subtask 13-3.3 Partnered Program/Project Management Support Tool (FIM09-7P)	Due Date	Status

AHPS Management System Tools including Scoping Data Sheets	-	On-hold, tools are unfunded, Scoping Data Sheets updated as need arises
QA Inundation/Depth Tools	-	On hold, unfunded In-kind
QA Metadata Tools	-	On hold, unfunded In-kind

Task Area #4 - Regional Flood Mapping Development		
Subtask 13-4.1 Eastern Region's Susquehanna River Flood Inundation Libraries	Due Date	Status
Implement up to 7 Flood Inundation Map Libraries	FY13Q4	Completed.
Subtask 13-4.2 Eastern Region's Delaware River Flood Inundation Libraries	Due Date	Status
Extend DRBC Flood Inundation Map Libraries	FY14Q2	Ongoing
Subtask 13-4.3 Western Region's Flood Mapping for Truckee River and other locations	Due Date	Status
Implement 2 <sup>nd</sup> Demonstration Flood Inundation Map Library in WR	Revised to FY14Q1	Ongoing, delays due to revised modeling requirements.
Subtask 13-4.3 Central Region's Flood Inundation Map Libraries	Due Date	Status
Implement additional Flood Inundation Map Libraries in Central Region	-	Ongoing, subject to available funds from NWS Partners and Stakeholders
Subtask 13-4.4 Southern Region's Flood Inundation Map Libraries	Due Date	Status
Implement additional Flood Inundation Map Libraries in Southern Region	-	Ongoing, subject to available funds from NWS Partners and Stakeholders
Subtask 13-4.5 QAQC Technical Review and Oversight Support (FIM10-2P)	Due Date	Status
Provide assistance to the regions for development/implementation of AHPS flood inundation mapping.	-	Completed and on a continual basis

Task Area #5 - Maintenance and Servicing Maps		
Subtask 13-5.1 Maintain AHPS Flood Maps (FIM09-10P)	Due Date	Status
Evaluate and Prioritize Map Updates	-	Ongoing and As Need basis
Work with WFO and RFC to update maps	-	Ongoing, but lack funding
Provide FIM Revisions on Test Platform for NWS Evaluation	-	Ongoing, but lack funding
Implement FIM updates on NWS AHPS FIM Regional Servers	-	Ongoing, but lack funding
Required FIM revisions to accommodate the change from River Stage Forecast to River Elevation Forecast for HMMT2 and WFDT2 and Relocation of services for ACRT2. FIM Maps (HMMT2, WFDT2, and ACRT2) have been taken offline.	-	Unfunded

### III. FY12/FY13 Accomplishments/Actions

In FY12, the NWS AHPS Flood Inundation Mapping Services were expanded into Idaho, Kansas, and Indiana. The following 15 AHPS FIM libraries were implemented in FY12:

- West Branch Susquehanna at Jersey City, PA - [JRSP1](#)
- Guadalupe River at Victoria, TX - [VICT2](#)
- Tuckasegee River at Bryson City, NC - [TKSN7](#)
- Blanchard River at Ottawa, OH - [OTTO1](#)
- Iowa River at Cedar Rapids, IA - [CIDI4](#)
- Boise River at Boise, ID - [BIGI1](#)
- Rio Grande at Rio Grande City, TX (RGDT2) - [RGDT2](#)
- Rio Grande at Del Rio, TX (DLRT2) - [DLRT2](#)
- Rio Grande at Eagle Pass, TX (EPPT2) - [EPPT2](#)
- Rio Grande at Laredo, TX (LDOT2) - [LDOT2](#)
- Wildcat Creek at Manhattan, KS (MWCK1) - [MWCK1](#)
- Driftwood River near Edinburgh, IN (DREI3) - [DREI3](#)
- White River near Nora, IN (NORI3) - [NORI3](#)
- St. Marys River at Muldoon Br, IN (SASI3) - [SASI3](#)
- Saddle River at Lodi, NJ (LODN4) - [LODN4](#)

In FY12, all Gulf Coast funded libraries have been implemented and completed. Thirty-two of the thirty-five projects had enough quality data and hydraulic models for implementation onto the NWS AHPS. Unfortunately, one of the 32 was deactivated as the NWS no longer were issuing forecast and warnings.

In FY13Q1, the following Flood Inundation Maps also had to be temporarily withheld:

- Cypress Creek at Westfield, TX - [WFDT2](#)
- Colorado River at Austin, TX - [ACRT2](#)

The forecast and warnings for Cypress Creek at Westfield, TX had changed from reporting stage values to elevation, but there were no available monies to either reprocess the libraries or adjust the legends from stage values to elevations for WFDT2. The gage for Colorado River at Austin, TX was relocated about a mile downstream, thus the hydraulics needed to be remodeled and maps to be updated. Since no funding has been allocated to maintenance for reprocessing or remapping, the maps for WFDT2 and ACRT2 had to be withdrawn.

In FY13Q2, the following four Flood Inundation Maps were added:

- Leaf River at Hattiesburg, MS - [HATM6](#)
- Suwanee Creek At Suwanee, GA - [SWEG1](#)
- Sweetwater Creek Near Austell, GA - [AUSG1](#)
- South Fork Little River at Hopkinsville - Bypass, KY (Central) - [HLBK2](#)

In FY13Q3, the following ten Flood Inundation Maps were added:

- Susquehanna River at Bainbridge, NY - [BAIN6](#)
- Susquehanna River at Conklin, NY - [CKLN6](#)
- Chenango River at Greene, NY - [GNEN6](#)
- Susquehanna River at Owego, NY - [OWGN6](#)
- Unadilla River at Rockdale, NY - [RCKN6](#)
- Susquehanna River at Unadilla, NY - [UNDN6](#)
- Susquehanna River at Windsor, NY - [WSRN6](#)
- Susquehanna River at Binghamtom, NY - [BNGN6](#)
- Susquehanna River at Vestal, NY - [VSTN6](#)
- Susquehanna River at Harrisburg, PA - [HARP1](#)

In FY13Q4, the following Flood Inundation Maps were added:

- Chenango River near Chenango Forks NY- [CNON6](#)

As of September 30, 2013, there were 92 [active Flood Inundation Map libraries](#) spread across 15 states.

**Task Area #1 - AHPS Flood Mapping Web Portal and Display****AHPS Web Portal for Levees and Flood Risk Areas**

- In coordination with Orion and NWS, IBM, contractor for FEMA Web Mapping Services, made IT configuration changes which vastly improved WMS response time and stability. This improvement allowed Orion to complete testing of software to allow NWS AHPS to pull FEMA National Flood Hazard Layers into AHPS webpage via AHPS CMS controls.
- The capabilities to display FEMA National Flood Hazard Layers on AHPS pages were demonstrated from Orion's Development Server for New York Harbor at the Battery ([BATN6](#)) and Saddle River in Lodi, New Jersey ([LODN4](#)).
- ERH, CRH, and HSD provided comments and suggestions on zooming capabilities, transparency levels, and opacity controls. Orion will be making these suggested changes in FY14Q1. Afterwards, National guidance would be provided for the field offices, who like to add this feature for the AHPS locations within their Hydrologic Service Area.

**Enhance Geospatial intelligence to NWS AHPS Products**

- In FY13Q4, USGS held informal meetings to discuss further testing of the piloted techniques & methodology for development of FIMs at other sites in the Susquehanna River.
- USGS obtained FIM datasets from NWS to test the same methodology, which had been developed for the lower Delaware River, and validate its applicability for Susquehanna River.
- The following were test sites chosen:
  - 01500500 Susquehanna River at Unadilla, NY (UNDN6)**  
Action, 9 ft., Flood, 11 ft., Moderate Flood, 13 ft., Major Flood Stage, 14.5 ft.
  - 01502632 Susquehanna River at Bainbridge, NY (BAIN6)**  
Action, 13 ft., Flood, 15 ft., Moderate Flood, 20 ft., Major Flood Stage, 22 ft.
  - 01503000 Susquehanna River at Conklin, NY (CKLN6)**  
Action, 8 ft., Flood, 12 ft., Moderate Flood, 15 ft., Major Flood Stage, 20 ft.
- USGS prepared an annotated outline for the final progress report.
- HSD coordinated with MARFC on project overview, status, and took action to collect review comments concerning the outline.
- NWS Leadership recommended that the report should discuss *where and when these procedures would be most applicable*.

**Task Area #3 - National Flood Inundation Mapping Guidelines and Program Standards****Concept of Operations and Requirements for National Flood Inundation Mapping Services**

- During FY13Q4, the IWRSS FIM Requirements team met at least bi-weekly via conference calls and held extra meetings to capture remaining requirements, weigh the importance of each requirement, and review the final drafts.
- On August 29th, Cline, Graziano, Clark, Hom, Lander, and Wells attended a meeting at the USGS headquarters in Reston, VA to provide final out-brief to the Integrated Water Resources Science and Services (IWRSS) Governance Board on the scoping and requirements for IWRSS System Interoperability and Data Synchronization (IDS) and Flood Inundation Mapping (FIM). Mr. Clark represented NOAA/NWS for IDS, while Dr. Graziano, Mr. Hom, and Mr. Lander represented NOAA/NWS for FIM. Dr. Cline represented NOAA/NWS as a member of the IWRSS Governance Board.
- The IDS out-brief focused on the scoping performed by the IDS team to identify requirements for streamlined information exchange between the IWRSS Consortium members (NOAA, USACE, and USGS). This includes not only requirements for nationally consistent data availability but techniques to ensure that the data is fully described through adoption of new format, protocol and metadata standards. In particular, FIM-related data and interoperability requirements for those which are essential to produce IWRSS flood inundation maps in real-time, near-real time, or statically, such as gage ratings, elevation data sets, H&H models, stream gage forecast and observations, and many more, were captured and made part of the IDS document.
- The FIM out-brief focused on high level recommendations and requirements for producing,

sharing and disseminating flood inundation maps. The IWRSS FIM team presented key findings, benefits, and overarching requirements for the national flood inundation mapping services. The IWRSS consortium shares a common goal of providing flood inundation map products to support stakeholders for all phases of the flood risk management life-cycle. Particular emphasis for this scoping requirements phase was placed on enhancing existing flood forecast and warning systems vital to the protection of life and property during flood events. At the out-brief, the team received valuable feedback from the IWRSS governance board, their guidance for completing the Requirements Document, and a strategy for path forward to address these overarching requirements for relatively low cost and high benefit FIM activities, which would contribute to the IWRSS National Flood Inundation Mapping Services.

- At the end of the quarter, the team submitted the *Requirements for the National Flood Inundation Mapping Services* document and fact sheet for final POC review and distribution to IWRSS Governance board. Kris Lander from CRH was the team leader to capture the IWRSS FIM Requirements. Victor Hom served on the team and Tom Graziano provided leadership guidance and oversight.

#### **Task Area #4 - Regional Flood Mapping Development**

##### **Eastern Region's Flood Inundation Mapping Project(s)**

- During FY13Q4, NWS ERH, WFO Binghamton, HSD/OHD, and SRBC implemented the following map library onto AHPS.  
[CNON6](#) Chenango River near Chenango Forks NY
- NWS ERH, OHRFC, and WFO Wilmington completed Phase 2 work with USGS and Licking County and Phase 3 Development of the Flood Inundation Map Libraries for the following three locations:  
[GRNO1](#) Raccoon Creek near Granville, OH  
[RCNO1](#) Raccoon Creek at Newark, OH  
[NEAO1](#) Licking River near Newark, OH  
These project maps have now been processed by Orion, put onto the dev. server, reviewed by HSD, and approved for Phase 3 Implementation in FY14Q1.
- NWS ERH, MARFC, and WFOs Philadelphia/Mount Holly and Upton worked with USGS, USACE, and others in the Passaic and Upper Saddle Communities to complete Phase 2, with HSD to complete phase 3 review, and with Orion to complete Phase 3 FIM Development for the six locations:  
[CAMN4](#) Passaic River at Chatham, NJ  
[MILN4](#) Passaic River near Millington, NJ  
[PPPN4](#) Pompton River at Pompton Plains, NJ  
[RDLN4](#) Pequannock River at Riverdale, NJ  
[SADN4](#) Upper Saddle at Saddle, NJ  
[DDCN4](#) Passaic River at Clifton (Dundee Dam), NJ  
During FY13Q4, Orion processed the data, put the maps onto the dev. server, and coordinated with NWS on the review, and approval of these maps for Phase 3 Implementation in FY14Q1.

##### **Central Region's Flood Inundation Mapping Project(s)**

- NWS CRH and WFO Indianapolis completed review of USGS FIMI maps for the Wabash River at Terre Haute, IN. The project maps have been processed by Orion, put onto the dev. server, reviewed by CRH, HSD, WFOs, and approved for Phase 3 Implementation in FY14Q1  
[HUF13](#) Wabash River at Terre Haute, IN
- NWS CRH and WFO Louisville completed initial review of USGS maps for the Kentucky River at Frankfort, KY. These maps were processed by Orion and were put onto the dev. server for phase 3 reviewed by CRH, HSD, and WFO. The maps were very complicated with substantial road networks, multiple levees, sandbag operations, and inundation underground urban road infrastructures. With a careful review performed in September 2013, issues were noted and brought to the attention of the USGS reprocessing.  
[FFTK2](#) Kentucky River at Frankfort, KY

##### **Southern Region's Flood Inundation Mapping Project(s)**

- WGRFC and HSD completed Phase 2 review of the maps provided by Halff Associates on behalf



of NWS IAO, IBWC, and Mexico for two other locations on the Rio Grande. The project maps were approved and provided to Orion for placement onto the dev. server as part of Phase 3 developments. In addition, due to extensive flooding in 2008, the community's requested the 2008 historical floodmap to be put onto the AHPS for the Presidio location. Thus, WGRFC and HSD worked to ensure accuracy, precision, map consistency, and proper delivery for this new AHPS FIM feature from the contractor to Orion.

[PRST2](#) Rio Grande at Presidio  
[CBBT2](#) Rio Grande at Colombia Bridge

- NWS SRH has been working with USACE and GA Silver Jackets to review the models, develop maps, and address levees/bridges for flood inundation maps for the [Ocmulgee River at Macon, GA \(MACG1\)](#). Maps are now ready for Orion to take receipt for Phase 3 Development.

#### **Western Region's Flood Inundation Mapping Project(s)**

- Due to difficulties in completing Phase 2 hydraulic modeling for the Truckee River at Vista, NV ([VISN2](#)) and the expiration of related funds for this Flood Inundation Map Library, WRH was asked to explore alternative locations for a FIM library.
- Alternate sites in the Chehalis River Basin were considered since existing work performed by West Consultants for the Chehalis River Basin Flood Authority had included hydraulic models and flood maps covering the various flood levels. These sites included:  
[NEWW1](#) Newaukum River near Chehalis, WA  
[CGMW1](#) Chehalis River near Grand Mound, WA  
[BCDW1](#) Skookumchuck River near Bucoda, WA  
[CENW1](#) Chehalis River at Centralia, WA  
 WRH, WFO SEW, and NWRFC will be examining the feasibility and suitability of these sites by reviewing the flood impacts, stability of rating curves, riverine structures such as levees, roadway infrastructure, and bridges

### **FY13 Q3**

#### **Task Area #1 - AHPS Flood Mapping Web Portal and Display**

##### **AHPS Web Portal for Levees and Flood Risk Areas**

- ERH, CRH, and HSD have coordinated and reviewed FEMA Region 2 requirements for inclusion of Flood Risk information from FEMA FIS Web Mapping Service into AHPS.
- These requirements have been forwarded to AHPS Contractor for assessment of costs and whether it can be accomplished with available funds provided by FEMA R2.
- The recommendations are to add FEMA National Flood Hazard Layers onto AHPS Gage Map using FEMA customized overlays for the 1%/0.2% Annual Chance Flood, Floodway, and Area with Reduced Risk Due to Levee.
- These layers would be controllable via AHPS CMS and available at pre-determined map scale.

##### **Enhance Geospatial intelligence to NWS AHPS Products**

- USGS OSW has been working with NWSH through USGS Pennsylvania Water Science Center on the project titled, **Develop and Demonstrate a Common Framework to Generate Flood Forecast Risk Maps.**
- Significant progress was made during the past quarter to (1) develop methodology to extract FEMA data and incorporate into GIS, with the following accomplishments made, (2) produce shapefiles for comparison with existing NWS AHPS FIMs; and (3) refine the methodology.
- During FY13Q3, USGS completed FIS-derived flood-inundation maps for Delaware River sites (New Hope/Lambertville, and Trenton) using proposed methodology. They completed a comparison of Delaware River FIS-derived FIMs (using both sets of DEMs) to existing NWS-AHPS FIMs with positive results.
- As a result of the positive results, USGS is now testing this methodology for sites on the Susquehanna River. Based on comments received from NWS and FEMA, USGS preliminary evaluation of available data, and remaining time/budget, the following Susquehanna River (NY) sites were selected for application of the pilot techniques & methodology for development of FIMs (a) Susquehanna River at Bainbridge, NY, (b) Susquehanna River at Windsor, NY,-and (c)

Susquehanna River at Conklin, NY

- During this quarter, USGS also reached out to NWS on several occasions to get additional guidance and AHPS FIM deliverables for Susquehanna sites. USGS has received preliminary FIS data for the proposed Susquehanna River sites in NY for further evaluations and refinement of the methodology.

### **Task Area #3 - National Flood Inundation Mapping Guidelines and Program Standards**

#### **Concept of Operations and Requirements for National Flood Inundation Mapping Services**

- During FY13Q3, the IWRSS FIM Requirements team met bi-weekly via conference calls and held extra meetings to discuss the requirements and review submitted drafts for the requirements document.
- At the end of the quarter, the team had drafted a Concept of Operations for National Flood Inundation Mapping Services.
- Five of the six sections of the draft report, namely, Section 1 - Introduction, Section 2 - Stakeholders, Section 3 - Current IWRSS Partner Practices and Guiding Policies for Operations, Section 4 - National Flood Inundation Mapping Services Requirements, and Section 5 - National Flood Inundation Mapping Services Concept of Operations have been edited and reviewed by the team.
- The last section, Section 6 - *Common Operating Picture* is about 90% completed.
- The team also coordinated a group call on June 26 with the IWRSS Interoperability and Data Synchronization (IDS) Requirements Team on data/systems interoperability concepts for Flood Inundation Mapping.
- NWS representatives from CRH, HSD, and OHD are directly involved in various aspects of this effort. A NOAA FIM advisory team, comprised of members from ERH, CRH, WRH, LMRFC, APRFC, OHD, and NOAA CSC, has also met monthly to discuss progress with NWS representatives directly involved in these efforts. The NOAA advisory team is tasked to review the draft report and provide comments.

#### **Partnered Program/Project Management Support Tool**

- The IWRSS FIM Requirements Team had recommended that NWS provide a link to the Product Development Template and the FIM Guidelines from the NWS webpage, when users are querying [About Inundation](#) on the NWS AHPS FIM Pages. The Product Development Template is to provide understanding of the coordination required to produce a flood inundation map.

### **Task Area #4 - Regional Flood Mapping Development**

#### **Eastern Region's Flood Inundation Mapping Project(s)**

- During FY13Q3, NWS ERH, WFO Binghamton, HSD/OHD, and SRBC implemented the following maps onto AHPS.

<a href="#">BAIN6</a>	Susquehanna River at Bainbridge, NY
<a href="#">CKLN6</a>	Susquehanna River at Conklin, NY
<a href="#">GNEN6</a>	Chenango River at Greene, NY
<a href="#">OWGN6</a>	Susquehanna River at Owego, NY
<a href="#">RCKN6</a>	Unadilla River at Rockdale, NY
<a href="#">UNDN6</a>	Susquehanna River at Unadilla, NY
<a href="#">WSRN6</a>	Susquehanna River at Windsor, NY
<a href="#">BNGN6</a>	Susquehanna River at Binghamton, NY
<a href="#">VSTN6</a>	Susquehanna River at Vestal, NY
- The maps for the following AHPS location are expected to be available in FY13 – Q4.

<a href="#">CNON6</a>	Chenango River near Chenango Forks NY
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- NWS ERH, WFO State College, and MARFC worked in partnership with Pennsylvania Silver Jackets, to develop flood inundation maps for the Susquehanna River at Harrisburg, PA ([HARP1](#)). These libraries were approved for implementation in FY13Q3 and have now been posted onto [AHPS FIM pages](#).
- NWS ERH, OHRFC, and WFO Wilmington have been working with USGS and Licking County to complete Phase 2 of the Flood Inundation Map Libraries for the following three locations:

<a href="#">GRNO1</a>	Raccoon Creek near Granville, OH
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[RCNO1](#)  
[NEAO1](#)

Raccoon Creek at Newark, OH  
Licking River near Newark, OH

These projects are now ready for Orion to start the Phase 3 implementation process

#### **Central Region's Flood Inundation Mapping Project(s)**

- In FY13Q3, CRH worked with USGS to complete Phase 2 of the Flood Inundation Map Libraries for Wabash River at Terre Haute ([HUF13](#)). This project is now ready for Orion to start the Phase 3 implementation process.

#### **Western Region's Flood Inundation Mapping Project(s)**

- In FY13Q3, WRH and WFO Reno continues to work Truckee River Flood Control performing Phase 2 of the Flood Inundation Map Libraries for Truckee River at Vista, NV ([VISN2](#)). This project is had difficulty due to the modeling. The partner had to do additional modeling work due to local flood control conditions which needs to be considered in the modeling. The revision requires new detailed cross section geometry for the modeled reach and addition of two added floodwalls. In addition, there is a desire now to produce 1-foot increments.

### **FY13 Q2**

#### **Task Area #1 - AHPS Flood Mapping Web Portal and Display**

##### **AHPS Web Portal for Levees and Flood Risk Areas**

- CRH led and coordinated AHPS FIM Levee discussion with USACE Silver Jackets Team for Missouri and USGS staff working on the Terre Haute, IN project. CRH and ERH have been leading the discussions and coordinating the AHPS display for Levees and flood risk areas behind levees with HSD.
- CRH, ERH, and HSD drafted concepts for displaying risk on the landward-side of the levees. The recommendations are to handle Federally (FEMA/USACE) verified levee, locally verified levee, and undocumented levee systems independently. All levees on FIM must include its centerline. Stakeholders with locally verified levees will need to provide documentation supporting the levee capacity to protect up to overtopping. Federally and locally verified levees will show area protected up to overtopping and an individual polygon layer will be provided to show the protected area, matching the USACE NLD. Stakeholders with Locally verified levees not in NLD will be encouraged to coordinate the levee flood risk area info with NLD. Undocumented levees will show area behind the levee as unprotected and thus will maintain current color water surface schema.
- ERH and HSD reviewed SRBC Floodmaps with Levees and USACE National Levee Database and found general agreements. To ensure consistency, recommendation is for AHPS to be able to show FEMA and USACE data made available from their respective Web Mapping Services.

#### **Task Area #2 - Quality Assurance and Consistency of Regional Flood Maps**

##### **Quality Assurance and Phase 2 Quality Control Training**

- The training, which was moved from FY13Q2 and tentative for FY13Q3, is subject to NWS Senior Leadership approval of funds for travel costs of the participants. Additional travel restrictions were added due to FY13 Sequestration and waivers would be needed. Funding has not been approved; therefore, no waivers and request could be submitted. Course is in jeopardy

#### **Task Area #3 - National Flood Inundation Mapping Guidelines and Program Standards**

##### **Concept of Operations and Requirements for National Flood Inundation Mapping Services**

- In FY13Q2, the IWRSS FIM Requirements team has met bi-weekly via conference calls with extra meetings added on as needed basis to discuss the requirements and review submitted drafts for the requirements document.
- In March 2013, the team met in Kansas City to review their respective agency's technical standards for flood inundation mapping, obtain a common understanding for a National Flood Inundation Map, defined the tech requirements for the Map, and specified requirements for a

National Map Viewer.

- The team recommended that the Map, envisioned as a flood inundation map, shall effectively communicate the estimated flood extents to floodplain managers, emergency management, and public personnel. Flood extents shall be based on hydrologic conditions and shall not include FEMA's DFIRM maps, which are frequency-based maps developed for regulatory purposes, however the FEMA models used to develop DFIRMs could be recalibrated and used to develop Flood Inundation Map Libraries.
- Since the terms, static or dynamic, are widely misunderstood, the team recommends that these terms not be used as an adjective in front of Flood Inundation Map or Map. When static or dynamic are used, it is in reference to the map generation process. The terminology has been adjusted relative to the user display of the map.
- Within the context of user display, the Map could take the form of the following:
  - 1) Map Library - a pre-calculated set of inundation boundaries for a reach. Typically, created in intervals around a USGS stream gage.
  - 2) Event Map - a map connected to a specified set of boundary conditions. It could be a map chosen out of the Map Library or a map generated for the particular forecast.
  - 3) Flood Documentation Map - a map created from peak measurements of a given flood event. It is neither modeled nor is it an event map generated from a forecast. It is a depiction of the actual maximum extent of flooding.
- The team met milestone #1 by completing a rough draft for Sections of Section 1 - Introduction, Section 2 - Stakeholders, Section 3 - Current IWRSS Partner Practices and Guiding Policies for Operations, and Section 4 - National Flood Inundation Mapping Services Requirements, Standards, and Methods. There still remains much work to make the document consistent and flow from section to section.

#### **Partnered Program/Project Management Support Tool**

- The Product Development Template has not been embedded with the FIM Guidelines. The template is to be incorporated after QAQC CSC Training with feedback from NWS participants and Regional FIM leads.

#### **Task Area #4 - Regional Flood Mapping Development**

##### **Eastern Region's Flood Inundation Mapping Projects**

- In FY13Q2, the following maps were approved for Phase 3 Final Implementation onto AHPS and are expected to be released in May 2013.

<a href="#">BAIN6</a>	Susquehanna River at Bainbridge, NY
<a href="#">CKLN6</a>	Susquehanna River at Conklin, NY
<a href="#">GNEN6</a>	Chenango River at Greene, NY
<a href="#">OWGN6</a>	Susquehanna River at Owego, NY
<a href="#">RCKN6</a>	Unadilla River at Rockdale, NY
<a href="#">UNDN6</a>	Susquehanna River at Unadilla, NY
<a href="#">WSRN6</a>	Susquehanna River at Windsor, NY
- In addition, the maps for the following AHPS locations were approved for Phase 3 Implementation and are expected to be available in June/July 2013.

<a href="#">BNGN6</a>	Susquehanna River at Binghamton, NY
<a href="#">VSTN6</a>	Susquehanna River at Vestal, NY
<a href="#">CNON6</a>	Chenango River near Chenango Forks NY
- Lessons Learned in these projects include: (1) For the urban areas, it takes time, meticulousness, and patience to review/clip roadway bridges, railroad bridges, and overpasses. (2) ERH created a shapefile masks for these clippings and recommended naming convention for this mask to clip the flood map layers. These masks could be used in on-the-fly mapping so the bridges and overpasses are properly shown whether inundated or dry. (3) Due to complexity of levees and the display of levee risks, an enhanced disclaimer will be required. (4) Renaming of the depth grids and polygons for NWS convention was required for this project. Libraries which are not partnered with NWS or IWRSS would need to be renamed before maps could be processed. (5) The gage locations were added to the base data folders so that they could be displayed on the map. (6) FEMA files were not available. Some communities do not participate in the NFIP. (7) Some of the map libraries required minor modification to the model extent shapefile.

- (8) Stakeholders would like to display a layer for flood control structures.
- These flood inundation map for the Susquehanna River Basin were developed in partnership with the Susquehanna River Basin Commission and Dewberry LLC. Special thanks to Ben Pratt (SRBC), Stu Geiger (Dewberry), James Brewster at WFO Binghamton, Charles Ross at WFO State College, and Laurie Hogan at SRH.

#### **Southern Region's Flood Inundation Mapping Projects**

- In FY13Q2, the following three Flood Inundation Maps were added in Southern Region:
  - 1) Leaf River at Hattiesburg, MS – [HATM6](#)
  - 2) Suwanee Creek At Suwanee, GA – [SWEG1](#)
  - 3) Sweetwater Creek Near Austell, GA – [AUSG1](#)
- The flood inundation map for Leaf River at Hattiesburg, MS was developed in partnership with the USGS Mississippi Water Science Center, City of Hattiesburg, City of Petal, Forrest County, Mississippi Emergency Management Agency, Mississippi Department of Homeland Security, and the Emergency Management District. Special thanks to John Storm and Michael Plunkett at the USGS, Ben Weiger and Tracy Clark at SRH, Katelyn Costanza and David Welch at LMRFC, and Marty Pope at WFO Jackson.
- The flood inundation maps for Suwanee Creek at Suwanee, GA (SWEG1) and for Sweetwater Creek near Austell, GA (AUSG1) were developed in partnership with the USGS Georgia Water Science Center and Georgia Environmental Protection Division (GA-EPD). Special thanks to Jonathan Musser and Brian McCallum at the USGS, Ben Weiger and Tracy Clark at SRH, John Schmidt and Todd Hamill at SERFC, and Kent Frantz at WFO Peachtree City.

#### **Central Region's Flood Inundation Mapping Projects**

- In FY13Q2, the following Flood Inundation Maps were added in Southern Region:
  - 1) South Fork Little River at Hopkinsville - Bypass, KY – [HLBK2](#)
- The flood inundation map for Hopkinsville, KY (HLBK2) was developed in partnership with the KY USGS Water Science Center, City of Hopkinsville, Hopkinsville Stormwater Utility and NWS. Special thanks to Mike Griffin and Jeremiah Lant at the USGS KY Water Science Center, Dave Herndon at City of Hopkinsville, Jim Noel at OHRFC, Mary Lamm at WFO Paducah, and Kris Lander at CRH.

### **FY13 Q1**

#### **Task Area #1 - AHPS Flood Mapping Web Portal and Display**

##### **AHPS Web Portal for Levees and Flood Risk Areas**

- The Core Goals team collected and reviewed requirements for AHPS to be able to consume FEMA RiskMap data in particular the flood inundation mapping delineation of the floodway, 1%, and 0.2% Annual Chance Floods from FEMA Web Mapping Service and display aerially with Flood forecast webpages. The ability to add other layers such as Historical Flood layers, geocoded E-19 flood impacts was also considered. Orion was allocated 284 hours to work on this development and the SRBC maps. There are also additional resources being provided by FEMA Region 2 for this subtask.
- Separate levee discussions were conducted with USACE by NWS CRH, ERH, SRH, HSD, SERFC, and WFOs Twin Cities, MN and Peachtree City, GA. Current projects with levee systems were reviewed and concepts of showing the flood risk behind levees were discussed for the Mississippi River at St. Paul MN and Ocmulgee River at Macon, GA.

##### **Provide more geospatial intelligence to NWS AHPS Products**

- A more prominent link to the YouTube User Guide Video on AHPS Flood Inundation Mapping has been placed on the AHPS FIM page: <http://water.weather.gov/ahps/inundation.php>
- Orion added a new feature for FIM which allows for additional layers to be added over the FIM display with added controls. AHPS CMS now allows NWS to arrange the display order of images 1-14, namely ten custom and four default layers, latter of which include Extent Boundaries and the three floodway images if available. Positive order values will display above all inundation layers. Negative order values will display below all inundation layers. Layers can be arranged relative to

the group of images as well. See pages 71-75 of the AHPS CMS Manual dated October 2012.

## **Task Area #2 - Quality Assurance and Consistency of Regional Flood Maps**

### **Quality Assurance and Phase 2 Quality Control Training**

- HSD and CSC held several conference calls to draft, review, and coordinated on an agenda, time schedule, and proposed dates for the training workshop. The training outline and agenda were finalized in early FY13Q1 with the Core Goals team
- The training has been moved from FY13Q2 and tentative for FY13Q3 subject to NWS Senior Leadership approval of funds for participants travel costs.

## **Task Area #3 - National Flood Inundation Mapping Guidelines and Program Standards**

### **Concept of Operations and Requirements for National Flood Inundation Mapping Services**

- The USACE, USGS, and NWS agency POCs and Team representatives met in Reston, VA in November 2013 to kickoff this initiative. Tom Graziano (HSD) is the agency POC and NWS Team Representatives includes Kris Lander (CRH) and Victor Hom (HSD).
- The team is to develop Concept of Operations and Requirements document, which addresses the following goals: (1) define the requirements and technical specifications for static and dynamic flood inundation mapping products and services; (2) evaluate and propose a viable flood-mapping concept of operations that efficiently and effectively leverages each agency's assets to generate inundation products, and (3) evaluate and specify the general requirements for the mutual modeling and information services frameworks (or common operating picture) to support the flood inundation mapping concept of operations.
- IN FY13Q1, the team met bi-weekly and accomplished the following: (1) determined that the customer for the National Flood Inundation Mapping Services (static and dynamic mapping) includes Emergency Managers, Flood Managers, Community Officials, Public, USACE, FEMA, USGS, and NWS, who are engaged in flood fighting, (2) collected agency comments on draft outlines, and (3) consolidated multiple draft outlines into a single outline. For agency POC review.
- The following are the five milestones for this subtask: *Milestone 1* - Requirements and Technical Specifications completed (March 31), *Milestone 2* - Concept of Operations completed (April 30), *Milestone 3* - Common Operating Picture completed (May 31), *Milestone 4* - POC review period of 2 weeks (June 1 to June 14), and *Milestone 5* - Final Requirements document delivered (July/August).

### **Partnered Program/Project Management Support Tool**

- HSD, CR SSD, and ER HSD expanded the QAQC Checklist into an NWS Product Development Template for FIM. This Product Development Template provides more detail, explanations, and tracking of the requirements for the development of Flood Forecast Inundation Mapping.
- The template has been tested by various partners in Southern, Central, and Western regions.
- This Product Development Template has been incorporated into the QAQC Workshop and NWS is to begin using this with our partners.
- The Product Development Template is being used as a FIM Scoping Sheet during FIM project kickoff.

## **Task Area #4 - Regional Flood Mapping Development**

### **Eastern Region's Flood Inundation Mapping Projects**

- IN FY13Q1, the following maps were available for Phase 3 QAQC review.
  - [BAIN6](#) Susquehanna River at Bainbridge, NY
  - [CKLN6](#) Susquehanna River at Conklin, NY
  - [GNEN6](#) Chenango River at Greene, NY
  - [OWGN6](#) Susquehanna River at Owego, NY
  - [RCKN6](#) Unadilla River at Rockdale, NY
  - [UNDN6](#) Susquehanna River at Unadilla, NY
  - [WSRN6](#) Susquehanna River at Windsor, NY
- NWS ERH worked with HSD to conduct the review and to address inundation underneath bridges, highways, and overpasses. Of these 7 maps, HSD had noted the complexity in handling the

- highway on-ramps, off-ramps, and culvert roads for BAIN6 and CKLN6.
- During the reprocessing in December 2012, ERH also captured step-by-step procedures required to process SRBC maps into NWS AHPS FIM. The intent is to capture these procedures and embed them into a Concept of Operations so that maps can be more seamlessly be produced and integrated into NWS FIM services. These turn-key procedures are also applicable to turning real-time dynamic modeling and mapping into NWS FIM services. The associated graphics to illustrating the step by step procedures were provided to HSD in January 2013.

#### **Southern Region's Flood Inundation Mapping Projects**

- LMRFC and HSD had completed QAQC of the shapefiles/depth rasters which USGS Mississippi Water Science Center, in collaboration with MEMA, the city of Hattiesburg, MS, and others, had provided to LMRFC for the Leaf River at Hattiesburg, MS ([HATM6](#)).
- LMRFC provided the FIM data for HATM6 to Orion to process and also produced additional files to make the libraries complete.
- Orion has implemented the FIM library for [HATM6](#) on the development test server and product is undergoing Phase 3 QAQC Review.
- SRH, SERFC, WFO Peachtree City, and HSD completed Phase 2QAQC for Suwanee Creek near Suwanee, GA ([SWEG1](#)) and Sweetwater Creek near Austell, GA ([AUSG1](#)).
- HSD worked with USGS to assemble the needed files for Orion to process.
- As of December 2012, Orion has implemented both of the FIM libraries for SWEG1 and AUSG1 on the development test server and products are undergoing Phase 3 QAQC Review.

#### **Central Region's Flood Inundation Mapping Projects**

- CR HSD had completed QAQC review of the shapefiles/depth rasters which USGS Kentucky Water Science Center, in collaboration with the city of Hopkinsville, KY, and others, had provided for the South Fork Little River at Hopkinsville - Bypass, KY ([HLBK2](#)).
- CR HSD provided the FIM data for HLBK2 to Orion to process.
- Orion has implemented the FIM library for [HLBK2](#) on the development test server and the product is undergoing Phase 3 QAQC Review.
- Silver Jackets Partnerships are strong in Missouri, Kansas, Minnesota, Indiana, Ohio, and Kentucky. As a result CR is working on several projects which may lead to NWS AHPS FIM for FY13 and FY14. In particular, USACE project at Cross Creek at Rossville, KS ([RSSK1](#)) looks very promising.

### **Task Area #5 – Maintenance and Servicing Maps**

#### **Maintain AHPS Flood Maps**

- The forecast and warnings for Cypress Creek at Westfield, TX (WFDT2) has changed from reporting stage values to elevation, which requires monies to reprocess the legends from stage values to elevations. HSD, SR, WGRFC, and HGX worked with Orion to develop possible alternatives to address the issue and restore the FIM libraries for WFDT2. The main problem is that the legends are processed by hard coding and generated to show the stage relative to elevation, since NWS uses predominately flood stages in its warning and forecasting.
- There are two recommended alternatives in dealing with the conversion of a stage/elevation based AHPS FIM libraries to an elevation based only library. An interim solution would require 2 hours to reprocess the legend with the following required steps: 1) Reprocess the legend; 2) Repackage KMZ downloads with updated legend. 3) QC, 4) Push to NIDS SVN, and 5) Deploy from NIDS SVN to both MO and MD. The long term solution of 100 labor hours is to revise the hard coding so that any changes would automate the inundation legend reprocessing within NIDS; triggered by an update to the zero-datum inundation field in the AHPS CMS or a change in flood categories. Since Texas and many stations in the country may be converted from stage to elevation NAVD88 to better tie into the built environment and its reference datum, the longer term solution is recommended, but no funds are available for both solutions.

### **IV. Problems Encountered/Remaining Issues**

FY13
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Headquarter and regional representatives could scope and collect stakeholder requirements, however, the challenge will be finding sufficient resources to address the latest technology, incorporate newer capabilities, and improve ways to map the flood risks to meet stakeholder needs. Any scoping of requirements and strategic planning will need to be very flexible and adaptable.

<b>Continuing Issues Identified in previous Fiscal Years</b>
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**General**

- The core goal team is having difficulties with setting mid-range project priorities to enhance the program due to the uncertainties of funding. Partnered funding/resources are only for developing AHPS FIM, neither for maintenance nor to address additional requirements.
- HSD needs fiscal and labor resources to develop, collect, stand-up, and maintain a public FIM webpage where best practices and webinars could also be posted.

## **Inputs and Forcings**

## Short-range radar-based quantitative precipitation forecasts

**Core Goal:** Improve the quality of physical inputs and forcings

**Management Lead:** David Kitzmiller

**Objective:** To develop and deliver a statistically-based 0-6 hour probabilistic quantitative precipitation forecasting system using remote-sensor and numerical prediction model input. The system is based on a Model Output Statistics approach requiring several years' data. Most work for which funding is requested is to be done in first two years.

### Milestones

Task	Due Date	Status
1. Archive necessary radar, lightning, and RUC2 numerical model output	Continuous	Ongoing – started FY09 Q2
2. Develop 6-h extrapolation prediction algorithm and codes based on operational High-Resolution Precipitation Nowcaster (HPN)	FY09/Q4	Done
3. Construct dataset with collocated radar extrapolation forecasts, satellite precipitation extrapolation forecasts, RUC2 precipitation forecasts, and Stage4 verifying precipitation, for available CY2009 data	FY10/Q1	Done
4. Deliver interim report on data evaluation, including CONUS-wide statistics on RUC2 and radar forecast correlations with observed precipitation	FY10/Q2	Done – EWRI conference preprint
5. Prepare and submit OSIP documents for implementation process – Completed HOSIP Gate2 review as a research project, to be followed on by an implementation task	FY10/Q3	HOSIP Gate2 review passed in FY10/Q2
6. Assemble statistical dataset and develop regionalized probability equations based on CY2009-2010 input data	FY10/Q4	Completed
7. Prepare a journal article on initial results from CY2009-CY2011 data	FY11/Q1	HOSIP gate3 conditionally passed in December; follow-up work on HOSIP documentation completed Q2  Slipped to July 2012; anticipate Q1 FY2013  Further slip to CY 2013  Not complete yet
8. Collaborate with NSSL hydrometeorology staff to implement real-time codes in MRMS system	FY14 Q2	Per new direction after MRMS QPE summit meeting June 2013

### Accomplishments/Actions

#### 1<sup>st</sup> Quarter FY12

- Conditional pass of HOSIP Gate3 in December
- Gave general seminar on results in December
- Got OHD management review of journal manuscript
- Initial planning to test real-time output in MARFC prototype flash flood prediction system using a version of the Distributed Hydrologic Model – Threshold Frequency approach – if accepted, to be started in CY 2012



## **2<sup>nd</sup> Quarter FY12**

- Completed corrections to science technical document following HOSIP review
- Continue to archive NMQ (radar) and RUC inputs to expand statistical database for future re-derivation of probability and amount equations
- Delays in correcting the journal manuscript due to other task priorities – plan to complete in May 2012
- Run the forecast model in real time during events of interest
- MARFC prototype flash flood prediction system testing/development is on indefinite hold due to budget issues
- Had initial discussions with NSSL staff, leading to a tentative plan to implement the forecast package within the MultiRadar-Multisensor (MRMS) system that supplies the radar input

## **3<sup>rd</sup> Quarter FY12**

- Had to modify scripts and codes in real-time prototype package to accommodate change of RUC model to new Rapid Refresh model in May.
- Initial work with NSSL staff to port the QPF package into MRMS
- Worked on journal article - delivery of final journal article delayed to incorporate suggestions from coauthors

## **4<sup>th</sup> Quarter FY12**

- Handed off code and scripts to run the 0-6hqpfc package within NSSL MRMS – final implementation still pending
- Sent out fresh analysis/verification based on April-September 2011 data to journal coauthors for review (early October).

## **1<sup>st</sup> Quarter FY13**

- Coauthors reviewed the draft journal article and suggested an additional form of product verification, namely Fractions Skill Score. These were calculated in December.
- The manuscript is being revised to include the Fractions Skill Score results
- Recovered the ability to run real-time forecasts within the OHD development system
- Revised code for the real-time package to be run in NSSL-MRMS was sent in December. Further coordination is needed to confirm it runs properly there.

## **2<sup>nd</sup> Quarter FY13**

- Delivery final journal article delayed (see above)
- No further word on possible MARFC DHM-TF work
- Recently completed remapping-reformatting code to put 0-6h QPF products into a format consistent with other MRMS products (April 2013)
- Continue working with NSSL staff on implementation in MRMS

## **3<sup>rd</sup> Quarter FY13**

- Delivery final journal article delayed
- A survey conducted in June indicated continuing interest in the product suite by RFC staff
- An MRMS QPE “summit” meeting was held June 13-14 to confirm priorities for development of new MRMS products, including this QPF package. Input from WFOs and RFCs was collected by OHD/HSD; NCEP and NSSL staff participated directly.
- Now anticipate real-time runs of the 0-6QPF starting in 2014, prior to implementation of the entire MRMS package within the NCEP Integrated Dissemination Program facility.
- Made ~50 real-time runs during the quarter, for current subjective evaluation and later statistical evaluation
- Completed remapping-reformatting code to put 0-6h QPF products into a format consistent with other MRMS products (April 2013 – per above)
- Continue working with NSSL staff on implementation in MRMS
- Prepared extrapolation forecasts and collected Rapid Refresh model output for the period October 2011-March 2013, for re-development of equations with 4 seasons’ data

#### **4<sup>th</sup> Quarter FY13**

- Limited work this quarter – further delay in delivery of journal article
- Still targeting FY14 implementation in MRMS-Q3 system
- Continued to collect and examine real-time forecasts
- Reported on results to staff at NCEP Weather Prediction Center, who indicated interest in the products
- Collected remaining input and verification data for April-September 2013, for evaluation and re-derivation of probability equations

### **Problems Encountered/Issues**

#### **1<sup>st</sup> Quarter FY12**

- None

#### **2<sup>nd</sup> Quarter FY12**

- Delivery final journal article delayed (see above)
- MARFC prototype flash flood prediction system testing/development is on indefinite hold due to budget issues

#### **3<sup>rd</sup> Quarter FY12**

- Delivery of final journal article delayed to incorporate suggestions from coauthors

#### **4<sup>th</sup> Quarter FY12**

- Lost most recent version of real-time operating scripts in September with major hardware failure in OHD. Have not yet recovered as of Sep 30th.

#### **1<sup>st</sup> Quarter FY13**

- Other priority tasks continue to delay final completion with delivery of journal manuscript and MRMS codes

#### **2<sup>nd</sup> Quarter FY13**

- Other priority tasks continue to delay final completion with delivery of journal manuscript

#### **3<sup>rd</sup> Quarter FY13**

- Delivery of final journal article delayed due to higher-priority tasks. We continue to archive input data and real-time forecasts

#### **4<sup>th</sup> Quarter FY13**

- Some loss of time due to shutdown preparation activity

## Gridded Hydrometeorological Forcings for Community Hydrologic Prediction System (CHPS) – FY10-FY11

**Core Goal:** Improve the quality of physical inputs and forcings

**Management Lead:** David Kitzmiller

**Objectives:** To facilitate RFC studies on biases or statistical differences between current operational basin-average forcings (precipitation, temperature, potential evapotranspiration [PET], and freezing level) and new gridded versions such as are intended to be used in CHPS. In many instances the forcings now entering the river forecast system are calculated from a weighted sum of point measurements; operational practice is shifting to calculating all basin-average forcings from grids, and in some documented instances the grid calculation is biased relative to point-based values, or relative to the calibration dataset. We will consolidate and summarize results reported by RFCs into a final document;

To consolidate and summarize any results on the impact of the new gridded forcings on hydrologic simulations with NWSRFS;

Identify methodologies and any ongoing projects for deriving a gridded calibration dataset of precipitation, temperature, and PET for all RFCs, based on in-house reanalysis, Analysis of Record (AOR), or other means; produce a report on preferred options for generating long-term calibration datasets for these variables at 4-km, 1-hour resolution;

Assist and coordinate with RFCs in cataloging archives of point and gridded hydrometeorological data using in constructing calibration datasets.

### Proposed Milestones:

Task	Due Date	Status
9. Archive forcings data from CAT sites (ABRFC, NERFC, CNRFC, NWRFC)	Continuous	Ongoing – started FY09 Q4
10. Initiate real-time archive development from all remaining RFCs	Initiate FY10/Q2	Ongoing at most sites – FY10 Q2
11. Document statistical differences between point-based and gridded forcings from MPE, Mountain Mapper/Daily QC, GFE, and report on findings.	FY10/Q3	Results reported from all CAT RFCs
12. Execute parallel streamflow simulations driven by point-based and grid-based basin average precipitation, temperature; report on magnitude of differences in simulations and differences in quality relative to gauge observations	FY10/Q3	Results reported from ABRFC, CNRFC, NERFC
13. Coordinate with RFC staff to locate historical point or gridded inputs (precipitation, temperature, cloud cover, winds, relative humidity) used to construct hydrologic calibration datasets – needed for either development of new datasets or verification of calibration datasets from an outside source such as AOR.	FY11/Q4	Revised later when OHD management requested time to review this plan

<b>14. Report on potential and preferred methods of deriving gridded calibration datasets</b> (other than precipitation and PET) of at least 50 year duration – possibly a re-analysis of historical data, or an external source such as the Analysis of Record (AOR) now under development, possibly other methods of reanalysis. Calibration datasets will be ~4-km mesh length, 1-h time series.	FY11/Q4	RTi scheduled report delivery FY12/Q2 Complete
<b>15. Report on potential and preferred methods of deriving gridded precipitation calibration dataset</b> , 50-year duration, including reanalysis with archive of RFC raingauge and radar data; available satellite products, and disaggregation of climatic datasets with daily-to-monthly total precipitation	FY11/Q4	RTi scheduled report delivery FY12/Q2 Complete
<b>16. Report on potential and methods of deriving gridded potential evapotranspiration (PET) calibration dataset</b> , focusing on geostationary satellite estimates of cloud cover and/or surface radiation balance, and reanalysis estimates of radiation balance, wind, temperature, and humidity.	FY11/Q4	Now includes tasks from original CHPS PET task from FY09
<b>17. (Tentative as of FY11 Q1): report on potential impact of PET forcings in calibration, to assess any impact of use of real-time estimates vs. application of local climatic values on hydrologic simulations</b>	FY12/Q1	
<b>18. Evaluate methods of improving MPE/DQC disaggregation of multi-hour precip accumulations to 1-h</b> , including spatial interpolation of 1-h radar QPE when necessary, use of reanalysis precipitation forecasts	FY12/Q1	Done – see Q3 FY12 item below
<b>19. Re-analysis for precipitation from point (gauge) observations:</b> develop offline capability for gridded record of precipitation for ≥ 10 years. Report on methods for further disaggregating to hourly time series.	FY12/Q2	Done – see Q3 FY12 item below
<b>20. Re-analysis for precipitation from radar/remote sensor observations:</b> Determine if CPC and/or NCDC efforts to produce long-term high-resolution gridded precipitation are moving forward. Depending on schedules, either prepare to utilize one of these sources or re-analyze existing StageIII/StageIV grids using external high-reliability sources such as PRISM monthly totals.	FY12/Q2 Now FY12/Q4	In progress as of September 2013
<b>21. Reanalysis for sky cover and remote-sensor PET:</b> Determine availability/reliability of RTMA or research sky cover datasets; create PET grids from these data and temperature, wind and relative humidity information from NARR	Deferred for work on other elements	

<b>22. Deliver hourly temperature and precipitation grids on 4-km HRAP projection, covering the 1981-2010 period, for CONUS and surrounding contributing areas. Will include only gridded inputs.</b>	FY13 Q4	Per directive of latest IWRSS forcings report, Jan . 2013  On track June 2013
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## Accomplishments/Actions

### 1<sup>st</sup> Quarter FY12

- IWRSS forcings team (Schneider, Fall, Kitzmiller) completed a report on possibilities for generating high-resolution grids of real-time hydrometeorological forcings, with implications for retrospective forcings (November)
- RTi staff continued work on their report on data sources and reanalysis methods for precipitation and temperature
- For the RTi report, RTi and OHD staff conducted phone interviews with staff at two RFCs, NCEP-CPC, and NESDIS-CIRA
- Filed a draft project plan late in the quarter – HOSIP gate2 time yet TBD
- Necessary background work on determining areas of effective radar coverage continues
- Background work on methods of merging information from sites reporting only daily max/min and sites reporting hourly temperatures continues

### 2<sup>nd</sup> Quarter FY12

- Riverside Technology (RTI) staff delivered two drafts of their report on potential inputs, analysis, and assessment methods for temperature and precipitation calibration analyses of record (AORs). OHD, HSD, and field staff are now reviewing and providing comments. RTI has reserved some time to make final revisions.
- Have made some revisions to the draft calibration AOR project plan, based on feedback on the RTI report thus far.
- The temperature (MAT) calibration preprocessor has been revised to generate point 1-h temperature values from daily maximum/minimum values. After some experimentation, a curve fit between a prescribed daily maximum and minimum time, based on cosine functions, will be used. Little or no benefit was obtained by trying to apply available hourly observations to the curve fit.
- Derived 10-year (2002-2011) daily precipitation amount and occurrence climatologies, on the national 4-km HRAP grid, based on StageIV (gauge-radar), StageII (radar-only), and Climate Prediction Center (gauge-only) analyses. Radar coverage artifacts are clearly apparent. A method for objectively specifying zones of radar coverage and gauge/radar bias corrections is being tested.
- Work is ongoing for an offline Multisensor Precipitation Estimator (MPE), functionally equivalent to the AWIPS MPE that will be used to merge gauge-radar-satellite precipitation inputs. It's being tested on data in the San Francisco/Sacramento region.
- Group participated in a multi-office 1-day workshop on needs for real-time and retrospective precipitation analyses (Feb 8). Reviewed resulting recommendations.

### 3<sup>rd</sup> Quarter FY12

- RTI staff delivered final report on inputs and methods for forming calibration AOR for temperature and precipitation
- Based on this report and other research, we've outlined a plan to use reanalysis, remote sensor (radar, satellite), and gridded climatic inputs to form a multi-decade background hourly record of temperature and precipitation – to be augmented in a final step with point surface observations to be selected by end users at RFCs and within USGS (see items 10, 11 above)
- Plan presented to RFC staff at DOH Virtual Workshop in June, and to USGS partners later in July. There's general concurrence with the plan.
- Targeting Sep 2012 for delivery of initial reanalysis/remote-sensor grids.
- An MAT preprocessor option to generate high-resolution hourly temperature grids from time

series is being added to the software – documentation forthcoming in 4<sup>th</sup> quarter

#### **4<sup>th</sup> Quarter FY12**

- We've carried forward with developing high-resolution gridded climatic datasets for monthly mean precipitation, daily precipitation frequency, and max/min temperature. Newly-available PRISM grids and station climatic normal for 1981-2010 from NCDC and Mexico were used.
- The climatic grids were used to assess bias in NARR and NLDAS precipitation datasets
- Some new requirements might be added based on considerations for IWRSS/NWC initial operating capability. We've discussed some possibilities with the IOC team; these include developing climatology based corrections for first-guess forcings, which will likely be taken from the Rapid Refresh model
- Plans are being re-scoped based on new requirements and some slowdowns in data exploration and processing

#### **1<sup>st</sup> Quarter FY13**

- We have a target set of products to be delivered by 1 Oct 2013, based on initial IWRSS/NWC planning. That is, a set of NLDAS forcings downscaled to the 4km HRAP grid and bias adjusted according to 1981-2010 climatology. The dataset will be hourly and will extend through at least the 1981-2010 period.
- Work on defining precipitation and temperature climatology to constrain the long-term record is ongoing, per the items below.
- New 4-km 1981-2010 precipitation and temperature climate grids for much of North America were supplied by NCDC staff. These are proving useful for regions not covered by the new PRISM datasets
- We are awaiting delivery of new station climate normals for 1981-2010 from Environment Canada. These will be used to estimate precipitation frequency, as an additional constraint to the mean monthly precipitation.
- Gridded mean hourly temperatures for 0000, 0300, ..., 2100 UTC have been developed from NCDC station data and PRISM and NCDC gridded monthly mean Tmin and Tmax. Mean hourly temperatures from 240 NCDC climate stations and other stations over Canada and Mexico were used to develop climatic diurnal temperature cycle information. These mean hourly temperature grids will be used to constrain the downscaled NLDAS hourly temperature fields.

#### **2<sup>nd</sup> Quarter FY13**

- Formulated a comprehensive plan for precipitation and temperature processing based on adjustment of hourly NLDAS values to agree with monthly PRISM time series over CONUS, and a monthly time series dataset maintained by U. East Anglia Climate Research Unit over OCONUS areas. The approach was recently published in Intl. J. Climatology.
- Will bias adjust the monthly time series above to agree with 1981-2010 climatology grids previously collected
- Planning a review seminar on above method, and initial findings, by May 15
- Outlined a longer-term plan for other weather elements, to be carried out in 2014 and beyond
- Collected the 1979-2012 time series of hourly NLDAS2 "A" forcings data and stored on (non-backup) space on Zeus

#### **3<sup>rd</sup> Quarter FY13**

- Conducted some internal reviews of the comprehensive plan during the quarter
- Got initial results on long-term precip and temperature biases (and corresponding correction factors) for the NLDAS2 record 1981-2010; to be applied to monthly total precip and monthly mean max/min temperatures 1979-2011
- Confirmed basic reliability of surface air temperature diurnal cycle in the NLDAS2 hourly record, by comparing with NCDC climatology at some individual 1<sup>st</sup>-order sites
- Aim to generate monthly mean temperatures (Tmax/Tmin) and monthly total precipitation, though bias corrections to NLDAS2/CRU grids, by August
- Aim to produce simple bias adjustment of original NLDAS2 precip, temperature - October
- Aim to apply 4km radar inputs, re-derive precip records - December

- Succeeding in decoding historical 40-km grid hourly Manually Digitized Radar records for the CONUS, covering 1979-1994. Initial evaluation indicates these data might be helpful in getting a better spatial/temporal resolution for precip in the pre-NEXRAD era, by using them to disaggregate daily/monthly NLDAS2 totals. The original NLDAS used only NARR reanalyses to temporally distribute precipitation to hourly, resulting in too many hours of light precipitation.

#### **4<sup>th</sup> Quarter FY13**

- Created 1979-2011 time series of monthly total precipitation and mean Tmax/Tmin for the NLDAS2 domain, merging PRISM data for CONUS with Climate Research Unit (CRU) for Canada and Mexico. Revision of the off-CONUS precipitation data will likely be needed
- We're carrying forward with checking of the monthly time series by verification with Global Historical Climate Network monthly station reports; results indicate the PRISM-CRU time series; after adjustment toward 30-year 1981-2010 climatology, has less bias and random error than corresponding NLDAS2 estimates
- We determined that historical 40-km grid hourly Manually Digitized Radar information has useful information on distribution of daily precipitation totals to hourly; we'll apply this information in future to pre-NEXRAD reanalysis

### **Problems Encountered/Issues**

#### **1<sup>st</sup> Quarter FY12**

- Due to shifting scope of the work, HOSIP gate2 dates for the original calibration AOR effort continue to be delayed. Gate2 will be set after review of the IWRSS team and RTi calibration reports, likely in FY12/Q3

#### **2<sup>nd</sup> Quarter FY12**

- Due to shifting scope of the work, HOSIP gate2 dates for the original calibration AOR effort continue to be delayed. Gate2 will be set after review of the IWRSS team and RTi calibration reports, likely in FY12/Q3

#### **3<sup>rd</sup> Quarter FY12**

- Some time lost due to confusion over status of the one non-FTE employee on the project – the individual was eventually retained on the project
- HOSIP gate2 continues to be delayed while we get buy-in from RFC and USGS partners – current plan appears acceptable based on feedback from RFC staff at DOH virtual workshop, and through meetings with USGS staff

#### **4<sup>th</sup> Quarter FY12**

- Some time and momentum were lost due to over 1 week of computer downtime in September
- In general, progress on data exploration and synthesis slower than hoped for.
- Plans are being re-scoped.

#### **1<sup>st</sup> Quarter FY13**

- Possibility that work might be re-scoped yet again, since the IWRSS/NWC report is being revised.

#### **2<sup>nd</sup> Quarter FY13**

- Previous problems resolved

#### **3<sup>rd</sup> Quarter FY13**

- Previous problems resolved

#### **4<sup>th</sup> Quarter FY13**

- Some time and momentum were lost due to shutdown preparations in September

## **Flash Flood Services**



## Distributed Hydrologic Model with Threshold Frequencies (DHM-TF)

**Core Goal:** Improve forecasts of fast response hydrologic events and improve relevant distributed hydrologic model spatial display and analysis tools (DHM-SDAT)

**Management Lead:** Michael Smith

**Objective:** Understand the nature of the model errors when running a distributed hydrologic model forced by WFO type data streams (e.g. 15 minute resolution observations and nowcasts). Do additional historical precipitation analysis to support the threshold frequency approach. Collaborate with the Baltimore/Washington, Binghamton, and Pittsburgh WFOs to evaluate real-time and retrospective DHM-TF simulations. Create and modify DHM output visualization tools guided by input from OHD and field offices.

### Milestones

Task	Due Date	Status
1. Implement Snow17 within BGM WFO DHM-TF operations	FY14 Q1	Ongoing
2. Implement DHM-TF at Baltimore/Washington WFO	FY10 Q3	Complete
3. Create and/or modify data visualization tools as needed	FY14 Q1	Ongoing
4. Recommend high level requirements for operational development	FY14 Q1	Ongoing
5. Publish results	FY14 Q1	Ongoing

### Accomplishments/Actions

#### 1st Quarter FY12

- Completed evaluation of DHM-TF for several test cases over PBZ, BGM, and LWX domains, and completed draft of DHM-TF evaluation report.
- Continued to work with staff at WFO BGM resolve problems related to transmission of MPE data to the WFO from the surrounding RFCs, and to resolve problems in obtaining RTMA data
- Began discussions with APRFC and Hawaii WFO centering on use of DHM-TF at WFO Hawaii.

#### 2nd Quarter FY12

- Completed DHM-TF evaluation report and distributed to RFC, WFO, and HQ audience
- Provided assistance to APRFC and Hawaii WFO centering on use of DHM-TF at WFO Hawaii.
- Provided assistance to LMRFC centering on use of DHM-TF at WFO Lake Charles.
- Modified xmrgtokml visualization program to allow for increased number of contour levels, plotting options, and color schemes

#### 3rd Quarter FY12

- Worked on deriving a seamless CONUS connectivity file and associated routing parameters which will support large-domain DHM-TF simulations.
- Continued to provide assistance to APRFC and Hawaii WFO centering on use of DHM-TF at WFO Hawaii.
- Continued to provide assistance to LMRFC centering on use of DHM-TF at WFO Lake Charles.
- Created automated set of software to download and visualize NOHRSC CONUS SAC-HTET/Snow17 simulations

#### 4th Quarter FY12

- Continued to work on deriving a seamless CONUS connectivity file and associated routing parameters which will support large-domain
- Continued to provide assistance to APRFC and LMRFC in their efforts to get DHM-TF up and running at their locations

**1st Quarter FY13**

- Completed first version of seamless CONUS connectivity file and associated routing parameters. Currently addressing connectivity problems discovered in the file.
- Continued to provide assistance to APRFC and LMRFC in their efforts to get DHM-TF up and running at their locations

**2<sup>nd</sup> Quarter FY13**

- Worked on revised version of seamless CONUS connectivity file and associated routing parameters. Currently addressing flow accumulation problems discovered in the file.
- Continued to provide assistance to APRFC and LMRFC. Each location has now brought up DHM-TF and executes the model automatically each hour.

**3<sup>rd</sup> Quarter FY13**

- Continued to work on revised version of seamless CONUS connectivity file and associated routing parameters. Generated continuous flow accumulation files for Mississippi and other large river basins that were not included in the NHDPlusV2 data set.
- Continued to provide assistance to APRFC and LMRFC in executing DHM-TF and diagnosing output.

**4<sup>th</sup> Quarter FY13**

- Revised process used to generate seamless CONUS connectivity file and associated routing parameters to better account for cross-boundary flow issues.
- Continued to provide assistance to MBRFC, WR (CBRFC), APRFC and LMRFC in configuring and/or executing DHM-TF and diagnosing output.
- Ran DHM-TF for several Colorado Front Range test cases as part of NOAA-NCAR flash flood project.

**Problems Encountered/Issues****1st Quarter FY12**

- None

**2nd Quarter FY12**

- None

**3rd Quarter FY12**

- None

**4<sup>th</sup> Quarter FY12**

- Extensive OHD disk failures impacted ability to conduct DHM-TF related research and support and slowed overall progress.

**1st Quarter FY13**

- None

**2nd Quarter FY13**

- None

**3rd Quarter FY13**

- Extensive and lengthy problems installing local copy of ArcMAP on desktop computer greatly slowed derivation of CONUS connectivity file and routing parameters.

**4th Quarter FY13**

- Problems with license for local copy of ArcMAP on desktop computer slowed derivation of CONUS connectivity file and routing parameters, as did disk problems on GIS server.

## Evaluate Gridded Flash Flood Guidance (GFFG) Approaches

**Core Goal:** Improve forecasts of fast response hydrologic events

**Management Lead:** Michael Smith (Project Lead: J.J. Gourley)

**Objective:** Quantitatively evaluate the ABRFC and OHD TF-GFFG approaches. Use observed streamflow data from small basins, grid inter-comparison techniques, and new verification data collected by NSSL. Evaluate NOAA-NESDIS percent impervious surface area (ISA) data for modeling applications in urban/suburban basins.

### Milestones

Task	Due Date	Status
6. Finalize and check TF-GFFG codes	FY10 Q3	Complete for 1 hr GFFG
7. Complete initial assessment of impervious surface area data for small basins	FY10 Q3	This should be re-scoped as a separate project.
8. Continue assessment of flash flood events and utility of SHAVE data	FY10 Q4	Complete
9. Assemble flash flood guidance values from 2006-present for all RFCs	FY11 Q2	Complete
10. Create CONUS-wide flash flood database using USGS streamflow observations	FY12 Q2	Complete
11. Produce DHM-TF values for RFCs with sufficient StageIV archive	FY12 Q3	Complete
12. Establish benchmark skill of operational FFG and GFFG methods over CONUS	FY12 Q4	Complete
13. Compare DHM-TF skill to operational FFG and GFFG skill	FY13 Q1	Pending funding
14. Evaluate FFG, GFFG and DHM-TF for flash flooding cases, with a focus on the predictability of specific impacts	FY13 Q2	Pending funding
15. Prototype products focused specifically on flash flooding impacts	FY13 Q3	Pending funding

### Accomplishments/Actions

#### 1<sup>st</sup> Quarter FY12

- Initial code has been written to objectively evaluate CONUS-wide FFG and GFFG using flash flood observation database.
- PI Gourley supervised the research of a visiting graduate student from the Universite Joseph Fourier, Grenoble, France. The graduate student completed his project on including specific impact classes to the SHAVE and NWS Storm Data observation datasets. He then used these reports to assess the spatial behavior of flash flood impacts during events.
- Server to host a variant of the DHM-TF method, forced with real-time Q2 observed rainfall, has been purchased and configured.

#### 2<sup>nd</sup> Quarter FY12

- Flash flood database comprised of observations from NWS StormDat, SHAVE, and USGS has been completed.
- Variant of DHM-TF method is now running in real-time over the ABRFC region with rainfall forcing from the Q2 rainfall at 1-km/5-min resolution.
- Graduate student from Universite Joseph Fourier (Martin Calliano) has presented the impact classification of SHAVE reports at the European Geophysical Union's session on flash flooding.

### **3<sup>rd</sup> Quarter FY12**

- Description of flash flood database comprised of observations from NWS StormDat, SHAVE, and USGS has been submitted to BAMS.
- Description of impact classification of SHAVE and NWS StormDat data has been submitted to Journal of Hydrology.
- Evaluation of CONUS-wide FFG, FFPI, and GFFG has been completed.

### **4<sup>th</sup> Quarter FY12**

- Description of flash flood database comprised of observations from NWS StormDat, SHAVE, and USGS has been accepted with minor revision for publication in BAMS.
- Description of impact classification of SHAVE and NWS StormDat data has been accepted for publication in the Journal of Hydrology.
- First draft of paper describing CONUS evaluation of FFG, FFPI, and GFFG has been completed and is undergoing revision.

### **1<sup>st</sup> Quarter FY13**

- Description of flash flood database comprised of observations from NWS StormDat SHAVE, and USGS is now in press in *BAMS*.
- Graduate student, Race Clark, presented the CONUS-wide evaluation of FFG at the AMS annual conference.
- Paper describing CONUS-wide evaluation of FFG and intercomparison of FFG, FFPI, GFFG, and DFFG has been submitted to *Wea. Forecasting*.
- Prototype flash-flood prediction system, NMQ-FLASH, has been awarded funding by NASA. Initial demonstration with a single member running at 1km/5min is running in real-time over the CONUS.
- PI Gourley presented the FFG results as well as NMQ-FLASH in the NWS Research and Innovation Transition Team seminar series.
- Submitted a proposal in response to the Sandy Supplemental bill that will deploy NMQ-FLASH (along with other radar-based hydrologic applications) at the National Water Center.

### **2<sup>nd</sup> Quarter FY13**

- PI Gourley presented the CONUS-wide FFG results as well as NMQ-FLASH in a UCAR/COMET course on flash flooding.

### **3<sup>rd</sup> Quarter FY13**

- NMQ-FLASH system was run in demonstration mode during the Flash Flood and Intense Rainfall (FFaIR) testbed experiment at the Weather Prediction Center. Results were qualitatively compared to operational flash flood guidance values on a daily basis.

### **4<sup>th</sup> Quarter FY13**

- An article describing the NMQ-FLASH system and its performance during FFaIR was submitted for publication in BAMS.

## **Problems Encountered/Issues**

### **1<sup>st</sup> Quarter FY12**

- There are still some IT-related delays in accessing the USGS database of streamflow over the US. Some of the data can now be read, and we have dedicated an entire computer to this ongoing task.

### **2<sup>nd</sup> Quarter FY12**

- Uncertainties in graduate student funding means we may have to move Mr. Race Clark to another project once his thesis project on CONUS-wide evaluation of operational flash flood

guidance approaches is completed (most likely by the end of summer).

**3<sup>rd</sup> Quarter FY12**

- There is no funding to support Mr. Clark's research on the CONUS-wide evaluation of operational flash flood guidance. Thus, it is unlikely additional reporting on this project will be made, once Mr. Clark is moved to another project.

**4<sup>th</sup> Quarter FY12**

- Mr. Race Clark has been moved to a NASA-supported project on CONUS-wide flash flood prediction.

**1<sup>st</sup> Quarter FY13**

- Lack of AHPS funding has caused us to redirect focus on the development of NMQ-FLASH rather than continued analyses of FFG, GFFG, comparisons to DHM-TF, etc.
- The lack of AHPS funding has also impacted the NWS National Precipitation Verification Unit. Apparently, they are no longer archiving CONUS FFG mosaics, thus preventing future studies to evaluate the methods.

**2nd Quarter FY13**

- None

**3rd Quarter FY13**

- None

**4th Quarter FY13**

- None

## FFMP Small Basin Support

**Core Goal:** Improve forecasts of fast response hydrologic events

**Management Lead:** Ami Arthur, NSSL

**Objective:** To provide training and assistance to all WFOs for customization of the FFMPA small-basin shapefile datasets, to coordinate and facilitate the sharing of customized files to prevent duplication of effort among WFOs, and to establish a repository for base and derived datasets and other information relevant to Gridded Flash Flood Guidance.

### Milestones

Task	Due Date	Status
6. FFMPA Dataset Tier II/ III Customization Webinars	Jan 2010	Completed
7. Develop a repository for base and derived datasets and other information relevant to Gridded Flash Flood Guidance (GFFG).	Sept. 30, 2010	Completed
8. Host, maintain, and update the National FFMP Basin Repository and the FFMP Basin Customization Repository, and continue to provide instructions, training, and technical assistance to FFMP dataset users.	Sept. 30, 2011	Ongoing

### Accomplishments/Actions

#### 1<sup>st</sup> Quarter FY12

- A possible solution to the AWIPS-II shapefile topology issue has been found. A script has been developed for ArcGIS that will eliminate the “dangling” polygons that appear to be causing the problem. Using the script, these areas are separated from their main basin polygon and then merged with a different adjacent basin polygon so that they are no longer “dangling”. Most of the dangling polygons are very small in area (generally less than 0.01 km<sup>2</sup>), so the effect of merging them with a different adjacent basin polygon is insignificant in most cases.

We are awaiting the response from the AWIPS-II FFMPA team regarding whether or not this is indeed the solution to the issue.

- We continue to receive and respond to various FFMPA dataset user requests and needs.

#### 2<sup>nd</sup> Quarter FY12

- We continue to receive and respond to various FFMPA dataset and customization requests and needs. During this quarter, we defined additional land areas between the coastal basins in MTR’s current FFMPA shapefile, and provided help with the FFMPA shapefiles in AWIPS-II when needed.

#### 3<sup>rd</sup> Quarter FY12

- During this quarter, considerable time was spent implementing the solution to the AWIPS-II shapefile topology issue.

#### 4<sup>th</sup> Quarter FY12

- We continue to make progress toward implementing the solution to the AWIPS-II FFMP shapefile topology issue.

#### 1<sup>st</sup> Quarter FY13

- We have continued to work on the solution to the AWIPS-II FFMP shapefile topology issue, and have continued to provide support to FFMP dataset users.

## **2<sup>nd</sup> Quarter FY13**

- We continue to work on the solution to the AWIPS-II FFMP shapefile topology issue. Approximately 70% of the basin edits for the CONUS have been completed at this time.

## **3<sup>rd</sup> Quarter FY13**

- We continue to provide support to FFMP dataset users and work on the solution to the AWIPS-II FFMP shapefile topology issue. We have completed enough of the topological edits to begin shapefile delivery. During June, FFMP shapefiles were delivered to AKQ, BUF, and SLC. We will continue with more deliveries in Q4.

## **4<sup>th</sup> Quarter FY13**

- During this quarter, we completed more updated FFMP datasets for sites preparing to move to AWIPS-II. We also made significant progress toward completing the next group of sites scheduled to move to AWIPS-II in October.

## **Problems Encountered/Issues**

### **1<sup>st</sup> Quarter FY12**

- none

### **2<sup>nd</sup> Quarter FY12**

- none

### **3<sup>rd</sup> Quarter FY12**

- In April, the machine that houses and serves all of the spatial data repositories (the National FFMP Basin Repository, the FFMP Basin Customization Repository, and the Hydrologic and GFFG Repository) failed. This machine served its NWS and other users well for six years, but unfortunately we do not have the necessary resources to replace it at this time. The data from these repositories is still available upon request and will be delivered via ftp.

### **4<sup>th</sup> Quarter FY12**

- none

### **1<sup>st</sup> Quarter FY13**

- none

### **2<sup>nd</sup> Quarter FY13**

- none

### **3<sup>rd</sup> Quarter FY13**

- none

### **4<sup>th</sup> Quarter FY13**

- none

## **Routing (Hydraulics)**



## River-Estuary-Ocean Modeling to Enhance Operational River Forecasting -- Chesapeake Bay Study Area

**Core Goal:** Improve the routing techniques used to connect forecast locations. Improve the quality of physical inputs and forcings (e.g. wind data into hydraulic models).

**Management Lead:** Hassan Mashriqui

**Objective:** Provide an accurate hydraulics model that extends from river mouths upstream to at least existing forecast points and beyond if necessary to achieve accuracy. Provide accurate river flow forecasts to NOS operational estuary models. Evaluate 2D/3D models or a combination of HEC-RAS and 2D/3D models to meet the goals. Evaluate and document appropriate boundary conditions, including water level and flux boundary conditions at the downstream boundary and wind forcings on the water surface.

### Milestones.

#### FY11 Milestones for Merged Project

Task	Due Date (original)	Comments
1. Compare HEC-RAS, CBOFS2, SLOSH/ET-Surge, Sobek 1D, and ADCIRC with wind	FY11 Q1	Complete
2. Submit drafts of two journal articles	FY11 Q2 (FY11 Q1)	Complete. Two articles were merged into one.
3. Finalize journal articles	FY11 Q3 (FY11 Q2)	Submitted one article to Journal of Hydraulic Engineering - Received reviewer comments and submitted revised manuscript. As of 4/22/13 this article is still in review. Received comments on revised manuscript and working on to address those comments.
3.1 Present at ECM12 (Twelfth International Conference on Estuarine and Coastal Modeling)	FY 12 Q1	Complete.
HOSIP Gate 3	FY11 Q3 (FY11 Q2)	Complete.
4. Participate in broader CERIS planning efforts	Ongoing	CERIS is officially on hold but we continue to interact with NOS and MDL on relevant topics. This task can continue after this project is closed.
5. Provide documentation to RFCs on how to access gridded extra-tropical surge data to use as HEC-RAS model boundary conditions	FY11 Q2	Complete
6. Prepare and deliver lecture on "Downstream Boundary Conditions for Coastal Hydraulic Situations" at Advanced HEC-RAS course.	Feb. 14, 2011	Complete
7. Prepare and deliver lecture for COMET Advanced Hydro Sciences Training on this topic.	August, 2011	Complete

### Accomplishments/Actions

#### 1<sup>st</sup> Quarter FY12

- Submitted a journal manuscript to OHD review: "A 1D River Hydraulic Model for Operational Flood Forecasting in the Tidal Potomac: Evaluation for Freshwater, Tidal, and Wind Driven Events." Gary and Ken Pavelle provided comments. The manuscript was revised, and finally submitted to the Journal of Hydraulic Engineering on January 18, 2012.
- Worked with MARFC to iron out final concerns with their Potomac HEC-RAS model implementation in CHPS. MARFC reported full satisfaction (1/3/2012).

- Prepared an inventory of coastal HEC-RAS models being used or in development at RFCs to emphasize (1) the strengths of existing capabilities and (2) the need for a wind term in HEC-RAS.

#### **2<sup>nd</sup> Quarter FY12**

- Waiting for reviewer comments on paper. All other activities are complete.

#### **3<sup>rd</sup> Quarter FY12**

- Developed multiple wind files in SOBEK on a reach by reach basis.

#### **4<sup>th</sup> Quarter FY12**

- Completed multiple wind modeling with SOBEK on a reach by reach basis.

#### **1st Quarter FY13**

- Submitted revised manuscript

#### **2st Quarter FY13**

- As of 4/22/13 revised manuscript is still under review

#### **3<sup>rd</sup> Quarter FY13**

- Received comments on revised manuscript and working on to address those comments, including a request to perform additional runs of the hydraulic model.

#### **4<sup>th</sup> Quarter FY13**

- Received comments on revised manuscript and working on to address those comments, including a request to perform additional runs of the hydraulic model.

### **Problems Encountered/Issues**

#### **1<sup>st</sup> Quarter FY12**

- None

#### **2<sup>nd</sup> Quarter FY12**

- None

#### **3<sup>rd</sup> Quarter FY12**

- Two co-authors, Seann and James, moved to new job and that may impact on the time to revise the manuscript.

#### **4th Quarter FY12**

- Two co-authors, Seann and James, moved to new job and that may impact on the time to revise the manuscript.

#### **1st Quarter FY13**

- Two co-authors, Seann and James, moved to new job and that had impacted on the time to revise the manuscript.

#### **2nd Quarter FY13**

- Two co-authors, Seann and James, moved to new job and that had impacted on the time to revise the manuscript.

#### **3rd Quarter FY13**

- Two co-authors, Seann and James, moved to new jobs and that had impacted on the time to revise the manuscript.

#### **4th Quarter FY13**

- Two co-authors, Seann and James, moved to new jobs and that had impacted on the time to revise the manuscript.

## **Software Refresh**

## Community Hydrologic Prediction System (CHPS)

**Core Goal:** Enhance the usability and/or internal workings of existing software

**Management Lead:** Jon Roe

**Project Manager:** Chris Brunner

**Objective:** Provide an improved software infrastructure for operational use at RFCs as a replacement for the existing NWSRFS, and which will meet the future forecasting needs of all RFCs.

### FY13 Milestones:

Task/Subtask FY13 Milestones	FY13 Due Date	Current Status
<b>1 CHPS Software Development</b>		
1.1 Deliver 2012.02 (Deltares)	FY13 Q2	Complete
1.2 Develop and deliver CHPS Calibration (Deltares, formerly OHD)	FY 13 Q2	Complete
1.3 Integrate Graphics Generator into CHPS Software Baseline (OHD)	FY13 Q2	Complete
1.4 Provide FEWS API to support CHPS enhancements (e.g., Calibration) (Deltares)	FY13 Q4	Complete
<b>2 CHPS Archive DB Development</b>		
2.1 Deliver a working Archive database for CHPS which replaces the RAX and the FEWS zip archive (NOHRSC/UCAR).	TBD	Canceled
<b>3 RFC Operational Support</b>		
3.1 Provide operational troubleshooting support for all RFCs (HSD/Think Tank, Deltares, RMA)	Q1-Q4	Ongoing
3.2 Provide software patches for Emergency, Critical, or High priority tickets when required for RFC operations (Deltares, OHD/CyberData, RMA)	Q1-Q4	Ongoing
3.3 Provide operational support to HSD as needed (OHD/CyberData)	Q1-Q4	Ongoing
3.4 Provide "GoTo meetings" for operational training purposes, as needed (Deltares)	Q1-Q4	Ongoing

### Accomplishments/Actions:

#### 1<sup>st</sup> Quarter FY12

- As of December 31, 2011 (end of Q1) all 13 RFCs had started using CHPS for forecasting operations. Some non-critical software tasks are scheduled to be completed in Q2 before the end of the main CHPS Implementation contract with Deltares.
- Deltares delivered numerous FEWS "show stopper" changes and fixes, which facilitated operational use of CHPS at the CAT-II RFCs. The remaining items are now deferred to FEWS stable release 2011.02.
- Deltares delivered the final Advanced Configuration training class to OHRFC in November.

- Deltares and OHD traveled to NCRFC in November to provide supplemental training and site support help to prepare the RFC for using CHPS in operations.
- Deltares began work on the 2011.02 stable release of FEWS. It is expected to be delivered and deployed nationally in Q2.
- FEWS stable release 2011.02 has been a higher priority than the API work because of its BOC-II content. Consequently Deltares has done little work on the API this quarter.
- USACE HEC announced their intention to release the official (Windows) 3.1 version of ResSim at the end of Q1. As soon as it is available, RMA has agreed to create and deliver a Linux version for CHPS.
- Parts&Labor led an evaluation of 2 sample social business software technologies (Jive, IBM Connections) as the basis for a CHPS web portal. Survey results yielded no particular preference. Next step is to consider whether a solution will be determined by the platform hosting the final solution. This phase of the project ends in Q2 (April).
- In Q2 OHD will evaluate a potential host for the CHPS web portal (NIDS).
- NOHRSC completed archiving of CHPS and IHFS station metadata.
- OHD hired a software Release Manager. During Q1 the contractor helped refine and document the release management process, and oversaw the release of several operational software components to the RFCs.
- At the end of Q4 FY11, warranties on the first set of CHPS hardware (for CAT RFCs) expired. In Q1 FY12 those warranties were renewed.
- One of the two HSD support contractors resigned during Q1; a replacement is expected by the start of Q2.
- Deltares delivered several BOC-II FEWS patches so the NWS could meet its CHPS implementation schedule. OHD delivered one unscheduled release. A HEC-RAS adapter patch was also delivered to the RFCs.
- OHD HSEB and HSMB contractors continued to provide operational support to HSD when needed.
- In November Deltares provided one System Management “GoTo meeting” for the RFCs. The final event in this series is expected during Q2.

## **2<sup>nd</sup> Quarter FY12**

- Remaining BOC-II software functionality was delivered to the RFCs via CHPS-2.0.1, which contained FEWS 2011.02, OHD-CORE-CHPS-2.1.a, and HEC-RAS\_4.1.0\_1.0.4. These components included numerous bug fixes identified during Q1 but deferred to Q2. Deltares and OHD also delivered the gridded FFG solution to MARFC (API-CONT/SNOW17). Documentation and the necessary configuration files were distributed.
- Due to the RFCs’ experiences with FEWS 2011.02 beta testing and fielding, OHD has decided to skip FEWS 2012.01 until Deltares can improve software versioning and testing. The next FEWS release for the RFCs will be 2012.02. Meanwhile, development builds based on 2012.01 will be used for prototyping other software development activities (Calibration, Data API, etc).
- CHPS Calibration: this project was originally led by OHD until it became clear that Deltares was still debating the nature of an Application Programming Interface (API). Calibration project leadership is now with Deltares. Accordingly, Deltares presented a design approach to the Calibration team (ABRFC, APRFC, CNRFC, CBRFC, NWRFC) which was approved and accepted. Next step is to deliver the first software prototype with sample configurations to the group for evaluation (early Q4).
- The Graphics Generator will not be included in the next CHPS software baseline release (July); instead it will be evaluated via the HEFS development releases to gain better insight into its operational usage and its computer resource needs.
- Deltares will resume the Data API work (related to the RFC Archive project at NOHRSC) in Q3. NOHRSC continues to design/code a new Archive database schema, but the developer requires a database “de-blobber” from Deltares before the end of Q3.
- Resource Management Associates (RMA) is working on delivering a Linux-based version of the USACE HEC’s ResSim version 3.1 for the NWS. Delivery is expected in Q3.
- Development of a fully functioning CHPS community web portal was canceled as a result of the FY12 budget cuts. These cuts applied to the web page development work by Parts&Labor (P&L) as well as the server to host/support the community site. Instead, P&L is designing a web package which will demonstrate the desired look and feel but without working functionality behind it. Some components of the design may end up on OHD’s web page or on an existing public

facing server. With or without the budget cuts, the primary goal is to replace the current FTP location which barely/minimally serves the CHPS community.

- OHD's software Release Manager has now assumed full responsibility for CHPS software delivery from OHD to the support group in HSD. The release process is described within a draft document which is awaiting review.
- OHD and Deltares continued to provide operational support to HSD. As of Q2 OHD nominated a single HSEB focal point to support HSD.

### **3<sup>rd</sup> Quarter FY12**

- CHPS Calibration: The first demo version of software and configurations showing the use of calibration tools in a sample RFC basin was expected from Deltares at the end of Q3; but it was delayed by one week, pushing delivery into Q4.
- FEWS Data API for Archive: a software development build with sample application of the data API was delivered by Deltares to NOHRSC for evaluation.
  - Related: CHPS-based archive database for RFCs: NOHRSC has designed and developed a database schema for the RFC data archive.
- Software development/maintenance for USACE Models and FEWS Adapters: HEC's contractor RMA delivered to OHD the official Linux-based ResSim version 3.1. OHD has encountered problems running it within CHPS on our development system. We will continue with CHPS-2.1.1 without ResSim, and deliver ResSim separately.
- CHPS community web portal: Parts&Labor finished the demo web site. OHD is looking for a place to host it. Meanwhile Deltares recently announced a new FEWS community web portal: [www.delft-fews.com](http://www.delft-fews.com)
- CHPS software release management: procedures are in place, and are now being extended to the HEFS project for its development releases. Draft document is updated as time permits. A CHPS-2.1.1 software release is planned for FY12 Q4.
- Operational troubleshooting support (HSD): one new contractor was added (Alfred Kwentua; replacement for Derryle Gogel).
- Software patches: FEWS patch 35025 was released. OHD-CORE-2.1.b was released. Upon leaving HSMB, Seann Reed trained HSEB and HSD in HEC-RAS troubleshooting techniques.
- Supplemental support to HSD: HSEB now uses a single point of contact for HSD for help with OHD-CORE software troubleshooting and resolution, or for general load-shed assistance. This means HSEB contractors spend less time providing support to HSD and more time working on software development tasks.

### **4<sup>th</sup> Quarter FY12**

- CHPS Calibration:
  - Deltares delivered to the Calibration RFCs the first demo version of software and configurations showing the use of calibration tools in a sample (NWRFC) basin. CBRFC successfully implemented one of their own basins using the expanded configurations. Deltares led a series of demos via GoToMeeting, culminating in the acceptance of this first phase as well as requirements for the second phase. The first phase/version will be included in the FEWS 2012.02 release, which will be distributed via CHPS-3.0.1 in Q2 FY2013.
  - OHD identified one custom transformation to be implemented using the new OpenAPI; it will complement the FEWS-based enhancements and will also be included in CHPS-3.0.1.
- OHD is planning for national deployment of the Graphics Generator in the next CHPS software baseline (CHPS-3.0.1) to be released in Q2 FY2013. Refer to the HEFS project status for additional information.
- Development of the FEWS API (OpenAPI) is underway. It will be an iterative and incremental activity, developed by Deltares. The first version will support the first set of CHPS Calibration requirements, plus some preliminary Archive DB requirements; it will also provide enough functionality to benefit some early Graphics Generator enhancements.
- Resource Management Associates, Inc. ("RMA") is OHD's software support contractor for CHPS-based ResSim and HEC-RAS.
  - This quarter RMA provided support related to some HEC-RAS problems in RFC operations.

- RMA is also assisting OHD implement HEC's official version 3.1 of ResSim within CHPS. During next quarter OHD will test first at CNRFC to make sure its operations are not impacted; then the release will be made available to all other RFCs.
- To close out the contract, Parts&Labor completed and delivered a demo version of a minimally functional CHPS Web Portal in Q3, but OHD has not been able to identify a permanent home. Google Sites does not provide a long term solution due to access right limitations outside NOAA. Furthermore, as a result of reduced budgets and a shift of focus away from CHPS to IWRSS/NWC, all OHD activities related to proactive development of the CHPS Community have now been put on indefinite hold.
- Archive database
  - NOHRSC has transferred project management for the RFC archive project to HSEB. The project requires definition and scoping, and an assessment of existing resources including a database schema already developed by - and in use at - NOHRSC.
  - A group of RFC representatives with years of association with this effort will meet in Q1 FY2013 to re-define this revived project and figure out a way to make it a reality. The undefined relationship between RFCs and the NWC are of particular concern.
  - AWIPS/OS&T plans for the RFCs include retiring the RAX servers, run archive-related applications on the PX, and provide space on the new netApps data storage device.
- Responsibility for CHPS software release management has now been fully transitioned from Deltares to OHD. OHD's Release Manager handles all CHPS software releases including Maintenance Releases (e.g. OHD-CORE-CHPS, HEC-RAS), HEFS Development Releases, and CHPS Scheduled Releases.
- HSD has initiated hardware warranty extension activities for the group of CHPS servers whose warranties will expire in Q1 FY2013. HSD and OHD are working with OS&T to get the CHPS hardware into the AWIPS baseline in FY2013.
- HSD contractors continued to provide operational troubleshooting services to all RFCs for numerous issues.
- Deltares provided two FEWS software patches during Q4 for the highest priority bug fixes.
- When needed OHD contractors provided some support to RFCs for issues concerning OHD-developed code.

### **1<sup>st</sup> Quarter FY13**

- 1.1 - During Q1 Deltares initiated the FEWS 2012.02 Alpha and Beta testing at 3 RFCs (APRFC, CBRFC, and NCRFC) and also at DOE/Bonneville Power Administration (BPA), which also uses CHPS. Testing will continue into Q2. FEWS 2012.02 will be a part of the CHPS-3.0.1 baseline release targeted for release in Q2.
- 1.2 - CHPS Calibration development phase 2 began in November. The RFC-based Calibration team determined the functionality was not mature enough for national deployment, leading Deltares to propose a new project plan which involves rapid application development through Q2 (February 2013). Deltares provided development builds and corresponding demos on November 14 and December 14.
- [1.3 - Graphics Generator into CHPS Software Baseline is covered in the HEFS status report.]
- 1.4 - Included with the Calibration features developed by Deltares was a more comprehensive Application Programming Interface (API). Using this, OHD was able to code four of the SQME algorithms and "plug them in" as custom transformations.
- 2.1 - The data piece of the FEWS API work has now been placed on hold due to the issues surrounding retrieval of Mods from the FEWS database. The data API was originally required for the Archive project, which is tasked with addressing archive needs for the NWC as well as the RFCs, but which has not yet generated an up-to-date set of requirements. When requirements are known, the data API work might resume. Meanwhile Deltares is also considering an archive approach for several other FEWS clients; this may or may not factor into a final solution for the NWS.
- 3.1, 3.2, 3.3 – contractors continued to assist HSD for CHPS operational support as needed. However due to the severe budget constraints, support has been reduced to bare minimum. At least one HEC-RAS bug fix by RMA was put on hold to preserve remaining funds for emergencies only. Additional funds are expected to be available next quarter. Additionally, a new contract is being prepared to follow-on from those which expire in September 2013.
- 3.4 – Deltares was tasked to provide a webinar demo on the FEWS zip archive in October.

## **2<sup>nd</sup> Quarter FY13**

- 1.1 – FEWS 2012.02 was included in the CHPS-3.0.1 Software Baseline, which was delivered to HSD in March 2013 for distribution to the RFCs.
- 1.2 - CHPS Calibration development continued in Q2. Deltares provided a final development build in February 2013, which was accepted by the RFC team members as adequate for most calibration tasks, containing no “showstoppers” in the FEWS implementation.
- 1.3 - Graphics Generator was included in the CHPS-3.0.1 Software Baseline, which was delivered to HSD in March 2013 for distribution to the RFCs.
- 1.4 - OHD began work on the ICP statistical summary report which is implemented in CHPS as FEWS HTML reports. This work is expected to continue into Q3
- 2.1 - The archive team was waiting for a project scoping document in the form of the IWRSS IOC plan; the latest manifestation of IOC tasks is referred to as the Water Forecasting Improvement Preparatory Project (WFIPP ). The document was released in March, with feedback to be discussed in Q3 (early April). The archive team will resume activities when the WFIPP document is finalized. Meanwhile Deltares is implementing a new archive approach for the HyFS project at the Australian Bureau of Meteorology; the enhancements are expected to be included in FEWS 2013.02.
- 3.1, 3.2, 3.3 – contractors continued to assist HSD for CHPS operational support as needed. Due to a combination of budget restrictions and slow contract activity, support provided by Deltares has been temporarily suspended but is expected to pick up again in Q3. Funds for the RMA contract were applied at the end of Q2 (delayed from Q1).
- 3.4 – no activity

## **3<sup>rd</sup> Quarter FY13**

- 1.2 – The CHPS Calibration capabilities for FEWS were integrated into FEWS 2013.02, which was not delivered to the NWS in Q3 as expected because of contract issues (referenced in 3.1 below). As soon as Deltares is ready to begin work under the contract (now estimate Q4), OHD can begin Beta testing for CHPS-4.0.1, which will include tests for Calibration. Also delayed is a Calibration webinar for training and familiarization.
- 1.4 - OHD finished work on the ICP statistical summary report as well as several other Calibration features not provided as part of the FEWS software. Comprehensive documentation was developed and will be finalized in Q4 for distribution to the field offices. We await resolution of the Deltares contract issues, at which point the first CHPS Calibration capability as a complete package (OHD-CORE and FEWS) can be tested and delivered to the field.
- 2.1 – This is no longer a CHPS item. The Water Forecasting Improvement Preparatory Project (WFIPP ) is addressing this requirement for hydro.
- 3.1, 3.2, 3.3 – contractors (non-Deltares) continued to assist HSD for CHPS operational support. The new contract with Deltares was awarded on June 10; however a disagreement concerning terms of the contract - along with a string of inexplicable delays - has resulted in a continued hiatus in Deltares FEWS support. AGO is working the issue with the expected resolution now slipped into Q4. Meanwhile, OHD began work on the replacement contract with RMA to continue HEC-ResSim and HEC-RAS support.
- 3.4 – no activity

## **4<sup>th</sup> Quarter FY13**

- With guidance from Deltares and a subset of RFCs, the development of an initial release of Calibration software for CHPS was completed. The CHPS Calibration software is in beta testing with deployment to the RFCs scheduled for November 2013.
- OHD started conversations with Raytheon with the goal of transitioning the responsibility for CHPS hardware and software deployment for the RFCs to AWIPS. For the initial release through AWIPS, the hardware delivery will consist of replacing the existing 6 CHPS servers with 3 RP servers. OHD and Raytheon are drafting a schedule for the initial deployment of CHPS hardware and software through AWIPS.

## **Problems Encountered/Issues:**



**1<sup>st</sup> Quarter FY12**

- Deltares has still not delivered the gridded FFG for MARFC; OHD has provided the SNOW-17 portions to Deltares for integration with the PCRaster method used for API-CONT. This is becoming a critical item. Deltares assures OHD it will be delivered in Q2.
- The Calibration project continued to languish due to the need to assign resources to CAT-II implementation and support. The project will not meet its deadline of January 2012. A new plan will be developed in Q2.
- Integration of the Graphics Generator into the CHPS software baseline has been delayed due to the same resources issue as Calibration.

**2<sup>nd</sup> Quarter FY12**

- None

**3<sup>rd</sup> Quarter FY12**

- None

**4<sup>th</sup> Quarter FY12**

- None

**1<sup>st</sup> Quarter FY13**

- Budget for AHPS-CHPS was significantly reduced in Q1, placing operational support at risk.

**2<sup>nd</sup> Quarter FY13**

- Existing Deltares contracts are out of funds and are due to expire in Q4; NOAA procurement has been minimally responsive to OHD's need to establish a new contract.

**3<sup>rd</sup> Quarter FY13**

- NOAA Acquisition awarded a contract to Deltares on June 10; however Deltares and AGO have not come to agreement on terms of the contract, and Deltares has not begun work. This is delaying the work on CHPS-4.0.1, as well as operational support. OHD continues to work with AGO toward a resolution.

**4<sup>th</sup> Quarter FY13**

- None

## **Dissemination (Web Pages)**

## AHPS Web Page Activities

**Core Goal:** Generate and disseminate information to and for our users

**Management Lead:** Donna Page

**Objective:** Provide a standard look and feel for the presentation of AHPS hydrologic and forecast information on the World Wide Web by all NWS weather offices.

### Milestones

Task	Due Date	Status
2. Initial Phase VII definition	FY12 Q1	Complete
3. Finalize Phase VII requirements	FY12 Q1	Complete
4. Phase VII development	FY12 Q1/Q2	Complete
5. Phase VII deployment	FY12 Q2	Complete
6. Initial Phase VIII definition	FY12 Q3	Complete
7. Finalize Phase VIII requirement	FY13 Q1	Complete
8. Phase VII+ deployment	FY13 Q2	Complete
8. Phase VIII development	New date FY14 Q1	In progress – some delay to refine requirements
9. Phase VIII deployment	FY13 Q4	Part 1 of 4 deployed

### Accomplishments/Actions

#### 1<sup>st</sup> Quarter FY12

- Finalized the development of an Inundation Google Maps interface
- Converted nine inundation gauge locations to Google Maps in development environment
- Worked with OCWWS HSD and NWS Regions to document requirements for Phase VII definitions
- Started development of AHPS Phase VII requirements
- Provided NIDS initial documentation on AHPS monitoring requirements
- Responded to emergency and non-urgent support requests which are tracked by NWS TOC
- Performed normal O&M activities during the period

#### 2<sup>nd</sup> Quarter FY12

- Implemented 13 Google Maps based inundation locations
- Finished development of AHPS Phase VII and implemented phase on NWS NIDS web-farms
- Update NIDS documentation on AHPS monitoring requirements
- Responded to emergency and non-urgent support requests which are tracked by NWS TOC
- Performed normal O&M activities during the period

#### 3<sup>rd</sup> Quarter FY12

- Implemented five Google Maps based inundation locations
- Worked with NWS Regions on AHPS 7 Plus requirements / planning
- Updated AHPS Precipitation Download page content
- Updated Low Water Impact controls within AHPS CMS
- Converted remaining AHPS backend scripts to use AHPS Phase 7 snapshot database table
- Responded to emergency and non-urgent support requests which are tracked by NWS TOC
- Performed normal O&M activities during the period

#### 4<sup>th</sup> Quarter FY12

- Delivered seven flood inundation locations for NWS review
- Created HML monitoring script for NIDS to use with Zabbix
- Audit water.weather.gov web logs and corrected discovered issues
- Corrected time zone from MST6 to MST7 in the NWSCMS
- Reordered low water impacts and low water records to ascending order on all pages
- Worked with NWS Regions on AHPS 7 Plus requirements / planning
- Responded to emergency and non-urgent support requests which are tracked by NWS TOC
- Performed normal O&M activities during the period

### **1<sup>st</sup> Quarter FY13**

- Updated and regenerated all precipitation images to use the new 1981-2010 normals
- Created and deployed instructional documentation for external websites to incorporate the AHPS national maps into their own websites
- Added the capability for AHPS CMS administrators to adjust the display order of the inundation image layers on the Google Maps interface
- Added NWS FIM YouTube video link to inundation national overview map page
- Update deprecated PHP4 code to PHP 5 standards
- Converted RSS feed generation scripts to use the NWSCMS database instead of flat files
- Converted KMZ file generation to use the NWSCMS database instead of flat files
- Updated all Numerical Models Links to point to new ncep.noaa.gov site
- Deployed Automated Flood Warning System (AFWS) to water.weather.gov/afws domain
- Corrected HRAPX and HRAPY typos on precipitation pages
- Updated “Hydrogen Days Ahead” values in the AHPS CMS to allow for 11 to 14 day forecasts
- Deployed updated AHPS CMS Documentation
- Responded to emergency and non-urgent support requests which are tracked by NWS TOC
- Performed normal O&M activities during the period

### **2<sup>nd</sup> Quarter FY13**

- Provided a National Analysis and Display of Long-range Flood Risk
- Added downloadable precipitation metadata
- Corrected inconsistencies between observed and forecast RSS feeds
- Unified AHPS and AHPS2 footers for consistency
- Decommissioned legacy Automated Flood Warning System (AFWS) and redirected all traffic to water.weather.gov/afws domain
- Allowed plotting of a negative low flow on hydrographs
- Added inundation columns to CMS report
- Deployed updated version of nctoasc to precipitation page
- Responded to emergency and non-urgent support requests which are tracked by NWS TOC
- Performed normal O&M activities during the period

### **3<sup>rd</sup> Quarter FY13**

- Addressed issue on hydrographs when using computed ratings and the low-flow threshold was set below the minimum rating curve value, the hydrograph was not drawn.
- Updated Orphan Gauge Report to better display mismatched river gauges.
- Added custom inundation layers to KML archives and repackaged all sites.
- Addressed issue where the AHPS River Menus were displaying duplicate rivers and updated the CMS “Dropdown Navigation” configuration page.
- Increased precipitation process threads from 2 to 6 for faster and more reliable processing.
- Updated XML, tabular, RSS and national forecast maps to match hydrograph days ahead. to achieve configuration for display of consistent data.
- Deployed updated national forecast slider which added an “entire period” button and better readability.
- Corrected issue where daylight savings time was being calculated incorrectly for AHPS RSS feeds.
- Added additional error checking to AHPS shapefile generation script to skip gauge with observation values in scientific notation.

- Created report that will display the NWSLIs that have mismatched HSA configurations between the AHPS CMS and NRLDB database tables.
- Responded to emergency and non-urgent support requests which are tracked by NWS TOC
- Performed normal O&M activities during the period

#### **4<sup>th</sup> Quarter FY13**

- Implemented 10 Google Maps based inundation locations.
- Corrected CSS styling issue in the inundation footer.
- Updated NWSCMS text to better explain the hydrograph x and y labels.
- Updated AHPS CMS documentation to include Google inundation and various other page updates.
- Fixed bug on AHPS flood inundation mapping current/forecast display.
- Deployed updates to AHPS forecast page time slider bar.
- Addressed issue with RSS feeds for the precipitation gauges under AHPS not working.
- Updated all references from WFO to HAS in the NWSCMS and AHPS documentation.
- Addressed issue where the precipitation pages were not updating and processes were backing up.
- Changed hydroParse code logic to only skip singular invalid HML instead of all products issued by the WFO.
- Updated precipitation download page to check for requested file and present the user the actual download size.
- Responded to emergency and non-urgent support requests which are tracked by NWS TOC.
- Performed normal O&M activities during the period.

### **Problems Encountered/Issues**

#### **1<sup>st</sup> Quarter FY12**

- NIDS network experiencing connection issues with NOAA LDAP services for AHPS CMS. AHPS is documenting these connection issues and provide results to NIDS.

#### **2<sup>nd</sup> Quarter FY12**

- NIDS network experiencing connection issues with NOAA LDAP services for AHPS CMS. AHPS is documenting these connection issues and provide results to NIDS.

#### **3<sup>rd</sup> Quarter FY12**

- NIDS network experiencing connection issues with NOAA LDAP services for AHPS CMS. AHPS is documenting these connection issues and provide results to NIDS.

#### **4<sup>th</sup> Quarter FY12**

- NIDS network experiencing connection issues with NOAA LDAP services for AHPS CMS. AHPS is documenting these connection issues and provide results to NIDS.

#### **1<sup>st</sup> Quarter FY13**

- None

#### **2<sup>nd</sup> Quarter FY13**

- None

#### **3<sup>rd</sup> Quarter FY13**

- None

#### **4<sup>th</sup> Quarter FY13**

- None

## **New Service Locations**

## FY2013 AHPS Activities for APRFC

**Management Lead:** Dave Streubel, Development and Operations Hydrologist

**Objective:** Implement AHPS services in the Alaska-Pacific River Forecast Center's area of responsibility.

**Milestones:**

### FY13 Planned New Service Locations

Area of Service (River Basin)	# New Locations	Location Names (LIDs)	Service Type Provided *see list below	Planned Completion Quarter	Actual Completion Quarter	Notes
Yukon River	9	KLNQ9 SRFQ9 SRMQ9 PRXQ9 YWRQ9 NIRQ9 WHRQ9 YDAQ9 YEAA2	Prob. AHPS	Q3 delayed		Delayed to 2013 Q4 or later due to AWIPS2 upgrade and loss of Canadian QPE analysis
Chulitna River	1	CLTA2	Prob. AHPS	Q2	Q2	
Skagway River	1	SKGA2	Prob. AHPS	Q1	Q1	
Staney Creek	1	SCKA2	Prob. AHPS	Q1	Q1	

\*Service Types available: Probabilistic on AHPS web (Prob. AHPS), SSHP-SAC, SSHP-API, Flood Inundation Mapping (FIM), Water Resources on Western Water web page (WR/WW), Probabilistic displayed only on RFC web page(Prob. RFC), Probabilistic delivered directly to partner (not on any web page)

### AHPS Service Location Summary

Time Frame	Probabilistic AHPS Web	Site Specific (SAC)	Site Specific (API)	Flood Inundation Map	Water Resources Sites on W. Water Web Page	Probabilistic RFC Web Only	Other	Number Unique Locations
FY13 Q1	2							
FY13 Q2	1							
FY13 Q3	9							
FY13 Q4	0						6	
Total FY13	12	0	0	0	0	0	0	
Overall Total (FY2000-2013)	91	0	0	0	20	0	6	91

**Accomplishments/Actions:**

#### 1<sup>st</sup> Quarter FY13

- Early in Q1 Identified 12 additional AHPS points that will be implemented this fiscal year. Implemented two points this quarter.

- **CHPS Innovations** (e.g. any extensions, configurations, displays, adaptors, collaborations, community models, etc.)
  - Developed retrospective QPE ensemble for 2012 in a stand-alone for precipitation forcings evaluation; comparisons of MPE-DQC and OFS forcings during entire summer and specific September flood event

#### 2<sup>nd</sup> Quarter FY 13

- CLTA2 AHPS probabilistic graphics will be generated May 2013 after USGS gage rating is re-evaluated post significant flood that occurred September

- **CHPS Innovations** (e.g. any extensions, configurations, displays, adaptors, collaborations, community models, etc.)
  - Implemented CHPS calibration workflows and displays to replicate functionality in ICP and introduced additional functionality provided by CHPS versatility

#### 3<sup>rd</sup> Quarter FY 13

- (Nothing new reported)

#### 4<sup>th</sup> Quarter FY13

- APRFC visited Honolulu WFO and made operational 6 deterministic short range forecast points for streams on Kauai. The forecast information is available via a CHPS VNC connection between APRFC and Honolulu WFO. Should assist in flash flood product generation.

### Problems Encountered/Issues

#### 1<sup>st</sup> Quarter FY13

- None

#### 2<sup>nd</sup> Quarter FY13

- None

#### 3<sup>rd</sup> Quarter FY13

- APRFC installed AWIPS2 April 2013 and lost functionality to query point data from NWP grids. This functionality was used in the process to create a QPE analysis for basins within Canada. This loss of functionality has increased model state uncertainty therefore making the implementation of the 3<sup>rd</sup> quarter AHPS points not warranted until further work can be done to find replacement analysis or restore query function.

#### 4<sup>th</sup> Quarter FY13

- None



## FY2013 AHPS Activities for NCRFC

**Management Lead:** Mike DeWeese

**Objective:** Implement AHPS for locations in the North Central River Forecast Center's area of responsibility. AHPS locations include those with probabilistic forecast products, Site Specific Hydrologic Prediction, statistical (Western) water supply, and/or inundation mapping points. For FY13, these would include WFO requested forecast points per below.

### Milestones:

#### FY13 Planned New Service Locations

Area of Service (River Basin)	# New Locations	Location Names (LIDs)	Service Type Provided *see list below	Planned Completion Quarter	Completion Quarter	Notes
Red River	1	Hickson, ND (HICN8)	AHPS Prob	Q2	Q1	
DuPage River	1	Warrenville, IL (WRNI2)	AHPS Prob, WR	Q2	Q1	
New, unplanned forecast points	1	Vulcan, MI (VLCM4)	AHPS Prob		Q1	

\*Service Types available: Probabilistic on AHPS web, SSHP-SAC, SSHP-API, Flood Inundation Mapping, Water Resources on Western Water web page, Probabilistic displayed only on RFC web page, Probabilistic delivered directly to partner (not on any web page)

#### AHPS Service Location Summary

Time Frame	Probabilistic AHPS Web	Site Specific (SAC)	Site Specific (API)	Forecast Inundation Map	Water Resources Sites on W. Water Web Page	Probabilistic RFC Web Only	Other	Number Unique Locations
Q1	3				1			3
Q2								
Q3								
Q4							9	
Total FY12								
Overall Total (FY2000-2012)								

### Problems Encountered/Issues

1<sup>st</sup> Quarter FY13 –

1. Awips 2 implementation at NCRFC continues to be delayed due to unresolved problems with GFE in the latest build. Trouble Ticket 538693 remains open on this issue.

**2<sup>nd</sup> Quarter FY13 – None**

**3<sup>rd</sup> Quarter FY13 – None**

**4<sup>th</sup> Quarter FY13 –** Remote CHPS access at ARX discontinued indefinitely due to the 204 network server failure. The surplus server that was providing WFO CHPS access has now been rededicated as our operational network server.

**Accomplishments/Actions:**

2. CHPS Innovations (e.g. any extensions, configurations, displays, adaptors, collaborations, community models)
3. Ensemble/Uncertainty Initiatives (e.g. HEFS testing and implementation, MMEFS developments, enhanced communication of uncertainty, etc.)
4. Forcing innovations (e.g. dual-pol, snow estimation, etc.)
5. Status of ongoing and new IWRSS innovations: Novel collaborations and initiatives in science, technology and stakeholder engagement demonstrating federal partners working together, leveraging resources and providing efficient and effective government (e.g., seamless data exchange, system interoperability and data synchronization, summit to sea modeling, flood inundation mapping, geo-intelligence improvements, common operating picture, etc.). Examples of innovations include the WGRFC web portal, OHRFC HEC-RAS inundation mapping, CNRFCs adaption of RES-SIM.
6. Significant external engagement (e.g., Silver Jackets, Fusion Team, Congressional activities, Impact-based Decision Support Services (IDSS), etc.)

**1<sup>st</sup> Quarter FY2013 –**

7. Completed development of national DSS mapping application for probabilistic outlooks and provided to OCCWS HSD for implementation.
8. Completed generation of ensembles for the Illinois State Water Survey as part of a risk evaluation project using design storm criteria under variable initial soil moisture conditions.
9. Participate in daily coordination calls with St. Louis and Rock Island USACE districts and LMRFC to support special 28-day forecast services on the Mississippi River from St. Louis to Thebes. This is to support USACE DSS for low flow mitigation activities to ensure continued navigation in the Thebes area.

Enhanced services include daily 28-day stage and flow forecasts at St. Louis, MO and Chester, IL. Forecasts are being provided to LMRFC for inclusion on LMRFC unadvertised/unlinked [web page](#) used by USACE.

HEC-RAS projects:

10. Initiating an FY13 Q2 project to implement a high resolution HEC-RAS model of the Red River of the North based on the latest USACE HEC-RAS diversion design model. The current high resolution model is not operationally viable due to extended run times with current CHPS hardware. The project goal is to optimize model run times and forecast accuracy by eliminating detailed storage areas not required to forecast mainstem stages. Project timeline is to have a revised high resolution operational HEC-RAS model implemented by FY13 Q3.

Problem: this model is based on HEC-RAS 4.2 which is incompatible with FEWS. It will therefore be run outside of CHPS in Windows, requiring significant operational overhead.

11. Implementing HEC-RAS on the Souris River in CHPS. Completion scheduled for Q2 FY13.

#### **2<sup>nd</sup> Quarter FY13 –**

##### **Accomplishments and Activities**

Completed operational implementation of a HEC-RAS model for the Souris River, including Minot, ND.

NCRFC collaborated with the NOAA Great Lakes Environmental Research Lab (GLERL) to develop a CHPS forecast system based on the NCRFC CHPS configuration. We provided technical assistance in implementing a stand-alone (SA) CHPS system at GLERL to support their Great Lakes Runoff Model Inter-comparison Project (GRIP).

#### **3<sup>rd</sup> Quarter FY13 –**

##### **Accomplishments and Activities**

Developing operational high resolution HEC-RAS model on the Red River of the North, based on USACE design model. This model requires RAS 4.2, which is not available in CHPS. Since the 4.2 linux version delivery date is still unknown, we are moving forward in developing a windows based operational modeling system. Initial performance tests on a high end PC show the shortest run times achieved are approximately 1.5 hours.

The NCRFC Runoff Risk Advisory and Forecast (RRAF) system implemented in the state of Wisconsin is now an approved official NWS forecast. We are continuing to collaborate with surrounding states and federal agencies who have expressed a great deal of interest in expanding this program.

NCRFC is collaborating with the USFS and the Upper Peninsula Power Company to develop inflow forecasts and water supply outlooks for decision support of a multiple reservoir system in the Ontonagon River basin in the Michigan U.P..

Implemented remote access to NCRFC CHPS forecast system at WFO ARX and conducted a remote CHPS training webinar. This is a pilot project to provide RFC models to the WFO for improved coordination and local decision support.

NCRFC is currently updating historical forcings for the entire HSA. This is not a routine update of recent climate data, but an effort to reprocess the entire period of record (1948-2012). The goal is to improve our initial historical data set using a more thorough analysis of station data, and incorporate recent extreme climatological events of the past few years into the data set.

We have implemented a version of the RDHM distributed model using the Sac-HTET soil moisture component to evaluate frozen ground simulation capabilities. Using observed data from the MN Dept. of Ag. Discovery Farms sites, preliminary results in the Red River basin show potential for predicting the timing of the soil thaw. Additional analysis is currently ongoing over a larger area including ND, MN, and WI.

#### **4<sup>th</sup> Quarter FY13 –**

##### **Accomplishments and Activities**

Awips 2 has been installed and is now operational at NCRFC.

NASA-U of Iowa IFLOODS project. NCRFC collaborated with this NASA/U. of Iowa and Iowa State University GPM ground validation experiment by issuing river flow forecasting to 4 watersheds located in the experiment area.

North Dakota State University (NDSU). NCRFC has been collaborating with NDSU on the collection of field observations on the Red River, including soil moisture and temperature and snow water equivalent at a few available sites. We are hoping to increase this collaboration by submitting a research grant proposal jointly with NDSU and Penn State University, to look at examining the properties of the Red River soils under heavy winter snow following a fall drought, as was the case during the 2013 snowmelt season.

##### **Runoff Risk Advisory and Forecast (RRAF):**

- Great Lakes Restoration Initiative. NCRFC was funded by GLRI in partnership with GLERL, OHRFC and the USGS and EPA to expand the RRAF to Michigan and Ohio, including a research component to determine the effect of farm tile drains on the overall watershed hydrology and pollutant transport. Most of the work will be done in FY 2015, with some small FY 2014 funding to support detailed project planning and coordination.
- NCRFC is partnering with the U. of Iowa to expand the RRAF to IOWA
- NCRFC has held discussions with the MN Department of Agriculture to expand the RRAF to MN.
- NCRFC has held discussions with MARFC about expanding RRAF to PA.

NCRFC is working on two NOAA/OAR-funded grants, one ("Improving Seasonal Drought Predictions in the Western USA: Developing and evaluating an ensemble snow modeling framework in the community hydrologic prediction system (CHPS)") in partnership with NCAR and another one ("Integrating Data Assimilation and Multi-modeling within CHPS for Improved Seasonal Drought Prediction.") in partnership with Portland State University. Funding for the grants was received too late to be able to be applied in FY13. NCRFC requested authorization to extend performance during FY14. Authorization from OAR was received. However, it is unclear whether the request for carrying over the remaining FY13 funding to FY14 will be approved.

NCRFC worked with the USGS, U. of Iowa, CUAHSI on an NSF-funded project under the Earth Cube initiative closely related to IWRSS goals. The project was invited to present a poster at the AGU General Assembly meeting in San Francisco in December.

NCRFC endorsed proposals from U. of Iowa, Iowa State University to NOAA and from George Mason University to NASA for collaborative work. Proposals are pending.

Added 9 reservoir inflow forecast locations for the Wisconsin Valley Improvement Company (WVIC), who coordinates reservoir releases among various utilities on the Wisconsin River. Simulated inflows are provided directly through a web portal.

NCRFC has updated our historical database through 2012, which now provides a 64 year period of record for our probabilistic outlooks. Reanalysis of the entire period of record, including station data, is ongoing and scheduled to be complete in Q4 2014.

NCRFC is working with NESDIS and APRFC on the validation of satellite-based remote sensed ice breakup algorithms.

NCRFC is collaborating with Manitoba Hydrologic Forecasting and Water Management to configure an international Red River of the North model in FEWS. The current NCRFC configuration will be provided to Manitoba, in addition to any HEC-RAS models we use from the USACE (by permission). This model will be extended into Canada to Winnipeg, providing a seamless modeling system for the entire Red River basin.

## FY2013 AHPS Activities for MBRFC

**Management Lead:**     **Scott Dummer**

**Objective:**     Implement AHPS for locations in the MB River Forecast Center's area of responsibility. AHPS locations include those with probabilistic forecast products, Site Specific Hydrologic Prediction, statistical (Western) water supply, and/or inundation mapping points. For FY13, this would include...

**Milestones:**

### FY13 Planned New Service Locations

Area of Service (River Basin)	# New Locations	Location Names (LIDs)	Service Type Provided *see list below	Planned Completion Quarter	Completion Quarter	Notes
Elkhorn/Platte Basin	1	Nickerson, NE (NKRN1)	AHPS Prob	2 <sup>nd</sup> Qtr	1	
Kansas Basin	10		AHPS Prob	4 <sup>th</sup> Qtr	4	
Lower Smoky Basin	1	Wodston, KS (WODK1)	AHPS Prob	4 <sup>th</sup> Qtr	4	
Lower Smoky Basin	14		AHPS Prob	4 <sup>th</sup> Qtr	4	
Osage Basin	8		AHPS Prob	4 <sup>th</sup> Qtr	4	
Bismarck HSA	5		SSHP/SAC	3 <sup>rd</sup> Qtr		Request Cancelled by WFO Bismarck
Topeka HSA	1	Topeka, KS (SGBK1)	SS (SAC)	3 <sup>rd</sup> Qtr	2	
New, unplanned forecast points						

\*Service Types available: Probabilistic on AHPS web, SSHP-SAC, SSHP-API, Flood Inundation Mapping, Water Resources on Western Water web page, Probabilistic displayed only on RFC web page, Probabilistic delivered directly to partner (not on any web page)

### AHPS Service Location Summary

Time Frame	Probabilistic AHPS Web	Site Specific (SAC)	Site Specific (API)	Forecast Inundation Map	Water Resources Sites on W. Water Web Page	Probabilistic RFC Web Only	Other	Number Unique Locations
Q1	1					1		1
Q2		1						
Q3	1					1		1
Q4	33							33
Total FY13	35							35
Overall Total (FY2000-2013)								

## **Problems Encountered/Issues**

**1st Quarter FY13 – None**

**2<sup>nd</sup> Quarter FY13 –** WFO Bismarck Cancelled their request for 5 SSHP points.

**3<sup>rd</sup> Quarter FY13 – None**

**4<sup>th</sup> Quarter FY13 – None**

## **Accomplishments/Actions:**

- CHPS Innovations (e.g. any extensions, configurations, displays, adaptors, collaborations, community models)
- Ensemble/Uncertainty Initiatives (e.g. HEFS testing and implementation, MMEFS developments, enhanced communication of uncertainty, etc.)
- Forcing innovations (e.g. dual-pol, snow estimation, etc.)
- Status of ongoing and new IWRSS innovations: Novel collaborations and initiatives in science, technology and stakeholder engagement demonstrating federal partners working together, leveraging resources and providing efficient and effective government (e.g., seamless data exchange, system interoperability and data synchronization, summit to sea modeling, flood inundation mapping, geo-intelligence improvements, common operating picture, etc.). Examples of innovations include the WGRFC web portal, OHRFC HEC-RAS inundation mapping, CNRFCs adaption of RES-SIM.
- Significant external engagement (e.g., Silver Jackets, Fusion Team, Congressional activities, Impact-based Decision Support Services (IDSS), etc.)

**1st Quarter FY13 –** Making significant progress with the HEC-RAS Missouri Mainstem Hydraulic Model. A stand-alone CHPS version is working. The model is currently being calibrated. Operational implementation is scheduled for the end of Q2.

**2<sup>nd</sup> Quarter FY13 –** Nearing completion of HEC-RAS Missouri Mainstem Hydraulic Model Development. Finishing up the model calibration. Scheduled to be operational in Q3.

**3<sup>rd</sup> Quarter FY13 –** Completed development & calibration of the HEC-RAS Missouri Mainstem Hydraulic Model. Adding RES-SIM to MBRFC operations so that 25 AHPS probabilistic points can be added to AHPS production. Added Woodston (WODK1) as a probabilistic AHPS point in July 2013.

**4<sup>th</sup> Quarter FY13 –** Completed 32 AHPS Points in the Kansas, Lower Smoky and Osage River Basins.

## FY2013 AHPS Activities for MARFC

**Management Lead:** Peter Ahnert (HIC), Seann Reed (DOH), Patti Wnek (SCH)

**Objective:** Implement AHPS services in the Middle Atlantic River Forecast Center's area of responsibility

**Milestones:**

### FY13 Planned New Service Locations

Area of Service (River Basin)	# New Locations	Location Names (LIDs)	Service Type Provided *	Planned Completion Quarter	Actual Completion Quarter	Notes #
Passaic	1	BOTN4	Prob. AHPS	FY13 Q1	FY13 Q1	Rockaway River @ Boonton, NJ above reservoir
Potomac	2	GTND2 WASD2	Unique	NA	FY13 Q2	Tidal Potomac River @ Georgetown/Wisconsin Ave and SW Waterfront/Maine Ave
Susquehanna	8	BAIN6, BNGN6, CKLN6, OWGN6, UNDN6, VSTN6, WSRN6, HARP1	FIM – Static	FY13 Q4	FY13 Q3	Susquehanna River @ Bainbridge, Binghamton, Conklin, Owego, Unadilla, Vestal, Windsor, & Harrisburg
Susquehanna	1	RCKN6	FIM – Static	FY13 Q4	FY13 Q3	Unadilla River @ Rockdale
Susquehanna	1	GNEN6	FIM – Static	FY13 Q4	FY 13 Q3	Chenango River @ Greene

\*Service Types available: Probabilistic on AHPS web, SSHP-SAC, SSHP-API, Flood Inundation Mapping, Water Resources on Western Water web page, Probabilistic displayed only on RFC web page, Probabilistic delivered directly to partner (not on any web page)

# Forecast service at BNTN4 was discontinued due to a landslide during Hurricane Irene. A new stream gage and new forecast service was established at Boonton, NJ above reservoir (BOTN4).

### AHPS Service Location Summary

Time Frame	Probabilistic AHPS Web	Site Specific (SAC)	Site Specific (API)	Forecast Inundation Map	Water Resources Sites on W. Water Web Page	Probabilistic RFC Web Only	Other	Number Unique Locations
Q1	1	0	0	0	0	0	0	0
Q2	0	0	0	0	0	0	2	2
Q3	0	0	0	10	0	0	0	0
Q4	0	0	0	0	0	0	0	0
Total FY13	1	0	0	0	0	0	0	0
Overall Total	174	0	33	21	0	0	2	2

### Accomplishments/Actions:

#### 1<sup>st</sup> Quarter FY2013

#### CHPS Innovations

- Hydrologic Modeling



- Provided flood forecasts, flood outlooks and other products & services for Hurricane Sandy. Major flooding occurred in the Potomac basin. Moderate flooding occurred in the Susquehanna & Rappahannock River basins & in Southeast PA. Positive feedback was received.
- Preparations for two tidal-influenced, HEC-RAS-modeled, forecast points (Washington DC) were completed. Preparation included staff familiarization, testing river forecasts for WFO LWX during Hurricane Sandy, and training webinar for WFO LWX SSH & management staff.
- Hosted visit by Dr. David Curtis (West Consultants) who presented seminar on the Chehalis River Flood Warning System in Washington State
- Provided data to Penn State meteorology student working on a project comparing the 'physically-based PIHM model to MARFC's operational models on a selected basin
- Internal staff review completed of Sandy. Recommendations and best practices documented.
- Created a Frederick (FRMM2)/Frederick (FDKM2) crest/crest plot to provide additional confidence in forecast near crest time. A plot was added to CHPS and FRMM2 stream gage data was added to Hydro Time Series.
- New forecast point on the Rockaway River at Boonton, NJ (above reservoir) was implemented
- Initiated discussion with WFO(s) on Dam Breaks to help identify and coordinate their need for support and information
- Upon resolution of IVP issues, river forecast verification data was ran for the past 3 months and submitted to OHD
- **AWIPS2**
  - 173 days operational on AWIPS2
  - AWIPS2 64-bit system was tested and implemented. Several FORTRAN issues were resolved
  - Software versions 12.11 & 12.12 were installed
  - PX servers were replaced
- **Service Backup**
  - Issues with NOAA Net were identified and resolved following test of remote backup at WFO PBZ in November. Once issues were resolved, a 2<sup>nd</sup> test in December was successful
- **CHPS**
  - Updated the OHD binaries
  - Fixing a lag K issue
- **GIS**
  - Attended WFO CTP GIS presentation
- **Passaic Basin**
  - Participated in a discussion with ER HSD and WFO(s) PHI & OKX for the release of new FIM(s), request for new forecast services, and plans for realignment of HSA responsibility in the basin. Coordination will continue through FY13.

### **Ensemble/Uncertainty Initiatives**

- **MMEFS**
  - MMEFS now running on CHPS. Migration work completed.
  - MARFC-led team completed the internal and external users' MMEFS training course
- **Hydrologic Ensemble Forecast System (HEFS)**
  - Continued OT&E
  - Downloaded latest software version 2.0
  - Added 4<sup>th</sup> test point
- **Inland Flooding**
  - Participated in conference call with NHC to describe inland flood needs and to recommend improvements to NHC inland flooding product
  - Virtually attended NOAA Hurricane meeting to speak to recommendations for inland flooding risk product. All recommendations were unanimously accepted by the regions, National Centers, HQ & NHC.
- Participated in Long Range Hydrologic forecast call with HSD
- Provided letter of support for very promising CSTAR proposal focused on improvements to ensemble hydrologic forecasting (lead PI - Dr. Alfonso Mejia, Penn State)

### **Forcing innovations (e.g. dual-pol, snow estimation, etc.)**

- QPF coordinated with neighboring RFC(s) & HPC during Sandy

- Provided letter of support for CSTAR proposal focused on a technique to improve operational analysis of rainfall data for heavy and extreme events (lead PI is Dr. DonJun Seo, University of Texas at Arlington).
- Attended WFO CTP Winter Weather Workshop
- Attended NOHRSC training webinar

#### **Status of ongoing and new IWRSS innovations**

- Staff received training in landslides via USGS webinar
- NJ Silver Jackets
  - Attended meeting in Trenton, NJ
  - Virtual participation to discuss Sandy recovery efforts while the team visited FEMA's Joint Field Office
- VA Silver Jackets
  - Participated in monthly conference call
  - Reviewed agency operations during Sandy and upcoming outreach opportunities
- PA Silver Jackets
  - Coordinated meeting with WFO CTP, ERH HSD and SRBC to plan outreach for new Harrisburg FIM
  - Timeline of activities was submitted to the PA Silver Jackets USACE lead
- Participated in monthly conference calls
- Attended USGS WaterSmart stakeholder webinar for the Delaware Basin
- Coordinated with WFO PHI & USGS NJ on impact of relocation of Boonton (above reservoir) stream gage
- Attended IWRSS stakeholder engagement forum for the Delaware Basin in Trenton, NJ

#### **Significant external engagement**

- Sandy
  - Led pre-event coordination conference call with partners in preparation for Sandy. Verified contacts for gages & reservoir operators. Shared plans for operations among all agencies.
  - Provided partners with 3-4 daily briefings throughout the flood threat. Positive feedback received.
  - Responded to several post-flood requests for precipitation, river forecast & MMEFS graphics from Sandy.
- NOAA-funded Nurture Nature Social Science Project
  - Participated in meeting in Easton, PA with WFO(s) BGM & PHI to kickoff Nurture Nature social science research project (NOAA grant)
  - Collected data, created QPF, modeled rivers, created river forecasts and wrote scenario timeline
  - Continued to create forecast guidance and graphics to be used for social science evaluation at stakeholder forums
- Presented on Irene & Lee river forecasting at Bucknell University's Susquehanna River Valley Symposium
- Presented on Irene & Lee flooding at the Pennsylvania Floodplain Managers Association annual meeting in Wilkes-Barre, PA
- Attended the Susquehanna River Basin Commission Federal Summit
- Outreach for the Kids
  - Demonstrated the impact of levees on flooding at the 1<sup>st</sup> annual Hydromania, at the Wilkes-Barre flood wall
  - Participated in 1<sup>st</sup> annual State College Weather Fest with multiple interactive flood safety activities
- Flood Inundation Maps
  - Led outreach planning with SRBC for new Harrisburg, PA FIM(s)
- MARFC Customer Advisory Board
  - Led bi-monthly conference call. Members shared their experiences in Sandy.
- DRBC Flood Advisory Committee - participated in quarterly meeting in Trenton, NJ
- University Students
  - Gave tours of RFC Operations to Shippensburg University meteorology students
  - Offered volunteer student positions to students attending Penn State University's Department of Meteorology and Department of Ecosystem Science & Management

- Created a one top outreach tool to assist people get NWS flood information for tidal and non-tidal stretches of rivers
- RFC Operations presentation to a delegation of meteorologists visiting from China
- Nurture Nature Science on a Sphere Project
  - NOAA-funded program “*Rising Waters*” is now available internationally to all other spheres (90+) in the network
  - Nurture had the short version of the program translated into Spanish so that the script can be used by all spheres for Spanish-speaking audiences
- PA Farm Show
  - Created informational posters for the NWS exhibit

## 2<sup>nd</sup> Quarter FY2013

### CHPS Innovations

- Hydrologic Modeling
  - Began issuing HEC-RAS model-based daily forecasts for two new forecast points in Washington D.C. in time for the presidential inauguration. First time using a hydraulic model (HEC-RAS) operationally. Both points are tidal-influenced on the Potomac River.
  - The new daily forecast points are:
    - GTND2 - Georgetown/Wisconsin Ave
    - WASD2 - SW Waterfront/Maine Ave
  - Attended Deltares Academy training in operational forecasting, Delft 3D and Delft FEWS
  - Transitioned forecast services at Middletown, PA from manual observation to the site of a new automated stream gage. Improved services to a full time series daily forecast.
  - Received USGS operating limits for streamflow gages in the North Atlantic region. This completes a TS Lee regional service assessment recommendation.
  - New online interactive digital forecast manual completed
- AWIPS2
  - AWIPS2 Operational Test and Evaluation (OT&E) successfully completed in January. Fully operational on AWIPS2
  - Software version 13.1 installed. Several issues documented. Identified major issue with AWIPS2 WAN backup when the collocated office’s satellite was OTS. Worked with OHD & NCF to correct the problem for all RFC(s) on AWIPS2.
  - AWIPS2 upgrade installed
- CHPS
  - Operational FFH is now CHPS-based
  - Shared best practices on a national OHD CHPS archive call
  - Attended CHPS Graphics Generator webinar familiarization training
- Flooding
  - Completed internal service review for major flood event in the Potomac Basin. Documented several best practices and recommendations.
  - Internal service assessment report written & presented to Sandy Service Assessment Team
  - 4 hydrologists won the National Cline Award for Hydrology (TS Lee)
- Low flow forecasting
  - Partner meeting (ICPRB & OHD) to discuss low flow forecast information needs for Potomac Basin
- Inland Flooding
  - Working with National Tropical Cyclone Impact Graphics Team to plan the improvement of the TCIG inland flood graphical product to include freshwater/river flooding
- USDA/AFRI Collaboration
  - Met with USDA re: “Developing a web-based forecasting tool for nutrient management” project, for the purpose of improving conservation and nutrient management planning in PA. Will provide river forecast model output that includes the four study watersheds in the Appalachian Plateau, Appalachian Valley and Ridge, and Appalachian Piedmont physiographic regions of Pennsylvania.

### Ensemble/Uncertainty Initiatives

- First in a series - Science Brown Bag Forum. Topic: EVS and HEC-RAS
- Joined the National Tropical Cyclone Impact Graphics Team as technical advisors
- MMEFS transitioned from experimental to operational. Assisted ERH with the transition.
- HEFS
  - Uploaded 11 HEFS segments to CHPS789 system. There are now 14 HEFS segments running operationally...WALN6, CENN6, HLEN6, DWNN6, HVDN6, CKFN6, FSHN6, CCRN6, BRYN6, HWYP1, MTMP1, NVXN6, BRGN6 and MTGN4. These segments are the Upper Delaware forecasting group.
  - New servers were physically installed and incorporated into the AWIPS2 network with the latest CHPS software and initial configuration synchronization
  - First RFC to complete resynchronization of rhamc10h with rhamc02. Now testing the system.

#### **Forcing innovations (e.g. dual-pol, snow estimation, etc.)**

- Developed & implemented new PRISM GIS technique to update of county precipitation normals
- Provided input to NOHRSC on SWE data needs
- Attended OH & WFO Peachtree City webinar on HPE/HPN Radar Data
- Coordinated SWE with NOHRSC and neighboring RFC(s)
- Listened to several precipitation forecasting talks from the ER Virtual Conference
- Attended NWS Emerging Services webinar
- Provided QC-ed hourly MPE data to USACE Norfolk District for their use in documenting a localized flood event at Gathright Dam

#### **Status of ongoing and new IWRSS innovations**

- Attended GeoDam-BREACH webex seminar
- Hydrologist nominated to ER AHPS Flood Inundation Map Quality Control Team
- NJ Silver Jackets – submitted Silver Jacket project ideas to the NJ & VA Teams to provide new forecast services based on hydraulic modeling. Participated in meeting & discussed project proposal to provide enhanced river forecast services to the Passaic River Basin.
- VA Silver Jackets – Presented project proposal to the team. Assisted USACE in writing project proposal.
- PA Silver Jackets – Team created Flood Risk Management Virtual Tool. Website went live. Provided links to NWS data/services.
- Wrote Outreach & Education portion of PA Silver Jacket Project Report for Harrisburg, PA FIM
- Participated in several planning meetings for PA Silver Jacket Non-Structural Flood-proofing Workshops in the Susquehanna Basin
- Participated in meetings with the MD, VA & PA Silver Jackets via conference calls
- Customer Advisory Board – hosted presentation by Dr. Cherie Schultz, ICPRB Director of CO-OP on the history and management of the Washington DC water supply
- Provided Water Resources stakeholder contacts for IWRSS survey in the Delaware, Susquehanna & Potomac River basins
- Provided input on Water Forecasting Improvement Preparatory Project plan
- Participated in IWRSS Stakeholder Engagement Workshops (Delaware, Susquehanna & Potomac Basins)

#### **Significant external engagement**

- PA Farm Show – created and staffed exhibit booth for the 8-day fair. Exhibit included a very popular Superstorm Sandy poster, a flood inundation map display and flood safety coloring pages for the kids. The Farm Show attendance was estimated to be 585,000.
- Commemorated the January 1996 Northeast Snowmelt Floods on Facebook & Twitter
- Provided briefings to partners during flood event late Jan/early Feb
- Participated in DRBC Flood Advisory Committee meetings in Trenton, NJ
- Helped plan & participated in the Passaic Flood Warning Users Group quarterly meeting
- Recruited summer student volunteer at Penn State University's Department of Ecosystem Science and Management Career Fair
- Presented on NWS operational river forecasting at EarthCube, Open Hydrospheric Modeling Framework (OHMF) Users Workshop in Pittsburgh, PA. OHMF is developing a prototype open data and open model system framework, with the main goal to significantly reduce the time and effort on

the part of users in the preparatory work for data and model comparisons, model testing and validations, and fundamental knowledge discoveries.

- Presented the NOAA award at the North Museum of Natural History and Science's regional science fair for 7-12<sup>th</sup> grade students, in Lancaster, PA. This fair is aligned with the Intel International Science and Engineering Fair, the world's largest international pre-college science competition.
- Provided river forecast training to Penn State University's Campus Weather Service students
- Penn State University Climate Studies class is writing weather summaries for MARFC flood events. Met with the class and gave a talk on flood climatology.
- Hosted visit from 7 Lycoming County, PA flood managers. Provided familiarization training in river forecast and warning operations. County officials gave talk on their flood alert system. This meeting was especially important because of the new county-owned stream gage at Muncy, PA.
- Participated in Central Region's NWSChat training webinar for external users
- Participated in National Flood Outlook press conference
- Received training in Twitter from SR
- Participated in Flood Safety Awareness Week through Social Media
- Nurture Nature Center collaboration recent results:
  - Movie version of Science on a Sphere *"Rising Waters"* show completed & posted online.
  - Digital magazine *"From Risk to Resiliency: Better Communities through Science Learning About Local Environmental Risks"* posted online.
  - Digital magazine version of children's flood coloring and activity book posted online.

### 3rd Quarter FY2013

#### CHPS Innovations

- Backup – backup system deployed to forecast during AWIPS2 outage Apr 11-12. Wrote technical summary of current backup system with a discussion of areas for improvement.
- Completed 3.0.1 installation on all CHPS servers
- GeoDam-BREACH - completed beta tests of FEMA GeoDam-BREACH tool. Provided comments and suggestions for improvement. Overall satisfaction with the new tool was high.
- Attended undergrad honors thesis talk by PSU meteorology student on API-CONT/SAC-SMI/PIHM hydrologic model comparisons. MARFC has been assisting the student through the past school year.
- Coordinated with USGS on lack of high flow measurements on Potomac River since 1996 and on possible corrections needed on ratings at Little Falls.
- Distributed Modeling:
  - Began trial run of RDHM
  - Reached out to WFO(s) for feedback on use of RDHM
  - Attended OHD DHM-TF Webinar
  - Led national RFC DOH discussion of RDHM activities at RFC(s)
  - Gave overview of MARFC's initial work on RDHM at staff meeting
- Stream Gages – attended USGS webinar, *"Modernizing Water Time-Series Data Collection & Processing."*
- Completed internal flood service review report of moderate flood event in the James Basin
- Authored paper, *"Comparison of the SAC-SMA and API-CONT Hydrologic Models at Several Susquehanna River Headwater Basins"* which was published as an Eastern Region Technical Attachment
- Volunteered to be a beta site for CHPS 4
- Reviewed draft CHPS training course for NWSTC
- Continuing to work with Deltares to resolve PCRaster FFG issues
- Received additional stream gage operating limits from the USGS. Only missing VA now.
- Completed internal flood service review of TS Andrea moderate flood event
- Worked with WFO PHI to provide USGS feedback on impacts to NWS services if dam removed on the Millstone River at Blackwells Mills, NJ. Dam removal is supported by NOAA Fisheries Restoration Center.
- Provided MPE data to Sr. Water Resources Engineer for use in modeling project
- Reviewing CHPS Users Training for NWSTC

- Attended HEC-RAS Enhancements webinar
- Signed on as Collaborator to the investigation, *"EarthCube Building Blocks: From data to user solutions: An open data, open modeling framework for the geoscience community."* Project was submitted by Dr. Xu Liang, Univ. of Pittsburgh to the National Science Foundation.

### **Ensemble/Uncertainty Initiatives**

- HEFS:
  - Hydrologists attended an HEFS training workshop at HQ in Silver Spring
  - Continued OT&E. Downloaded latest HEFS version and began configuration.
- TCIG – continued to participate in national team activities to improve the inland flood graphic
- Attended OHD training on new AHPS Experimental Long Range River Flood Risk product

### **Forcing innovations (e.g. dual-pol, snow estimation, etc.)**

- Added a climatology section to the Digital Forecast Manual for reference. Forecasters can look up monthly precipitation and average high/low temperature values by county. Values are based on the 1981-2010 PRISM datasets.
- Passaic Flood Warning System – participated in several transition calls with ER HSD, WFO PHI & OKX and OCWS HSD to determine NWS requirements for precipitation data in the Passaic Basin.
- Rain Gages – 9 new precipitation gages & one new DCP added to forecast operations
- Attended CPC Atlantic Basin Tropical Cyclone Outlook webinar
- 2013 Hurricane Season – attended SR Virtual Tropical DSS Workshop
- Precipitation Frequency Project (Northeast):
  - Provided precipitation data sets to OHD
  - Reviewed a list of dataset sources for use by NOAA Hydrometeorological Design Studies Center

### **Status of ongoing and new IWRSS innovations**

- NJ Silver Jackets – MARFC project proposal to model a portion of the Passaic basin using an unsteady HEC-RAS model was submitted by the NJ state team
- VA Silver Jackets – MARFC project proposal to improve estuary river forecasts through the addition of wind information into the HEC-RAS model was submitted by the VA state team
- PA Silver Jackets – Reviewed final draft report for current Harrisburg FIM project. QC-ed FIMs of Harrisburg. Identified 20+ issues for ERH HSD. Continued work with SRBC to plan presentations and design brochure and magnet for Harrisburg FIM outreach. The team submitted a project proposal to create flood inundation maps for Wilkes-Barre.
- Completed *"IWRSS Resource Info Needs"* surveys for the Susquehanna, Potomac & Delaware basins.
- 9 NY Flood Inundation Mapping libraries posted to AHPS: Susquehanna River at Bainbridge, Binghamton, Conklin, Owego, Unadilla, Vestal & Windsor, Unadilla River at Rockdale and Chenango River at Greene.

### **Significant external engagement**

- Earth Day
  - *"Earth Day along the Susquehanna River"* – new collaborative outreach event for MARFC & WFO BGM. Located along levee in Wilkes-Barre, PA. Reached 3,000 students grades 5-8.
  - Celebrated Earth Week with special MARFC social media posts
- Nurture Nature Center Social Science Project:
  - NWS (MARFC & WFO PHI) completed all deliverables (mock forecasts, graphics, watches & warnings) ahead of schedule
  - Provided graphics for poster presentation at the Association of American Geographers Annual Meeting, Los Angeles, CA
  - Reviewed draft scripts for Stakeholder Forums
  - Presented ideas for educational pieces
  - Provided supporting historic inland flood graphics & other info

- Shared community outreach ideas from Philadelphia Green City Clean Waters with Nurture Nature & invited them to several NWS social science & climate related webinars
- Two Stakeholder Forums held
- Submitted abstract for NWA conference
- Reviewed draft educational pieces
- Presentation made to NOAA Grant group
- NJEPC – provided flood safety outreach materials and Hurricane Sandy precipitation data for WFO PHI Emergency Manager Hydrology Course at the NJ Emergency Preparedness Conference
- Academia:
  - Columbia University, Earth Observatory, Department of Applied Physics & Mathematics – provided several years of river forecasts for use in student research project on flooding in Conklin, NY
  - PSU – hosted visit by faculty, staff & students of Department of Geography “*Riparia*” center. Future collaboration possibilities discussed.
- SRBC - Attended Cumulative Water Use webinar
- Weather Forecast Offices
  - CTP – Hydrologist gave a river forecasting presentation at their warm season workshop
  - LWX – DOH gave a talk on tidal Potomac modeling with an emphasis on future potential expansion for the Coastal/Tidal Flood Users group
- Metropolitan Washington DC Council of Governments – attended drought workshop via webinar
- Tree Stewards – learned of new customer of MARFC MPE data. DSS assists with managing city park tree watering activities.
- Hydromania – led two hydrology & flood safety learning activities for 1,500 3<sup>rd</sup> graders
- Customer Advisory Board – bimonthly meeting held. Reviewed hurricane season expectations, new products & preparations.
- Gave talk on MMEFS and flood safety outreach at CTP Media Workshop. Made several new contacts and filled several requests for info.
- Social Media:
  - Surpassed 1,000 Likes milestone on Facebook
  - Training received on Hootsuite
  - Promoted Hurricane Preparedness and Safe Boating weeks
  - Training:
    - Federal ethics for Social Media
    - Hootsuite
    - NWS Binghamton's Facebook Success and How They've Achieved It
- MARFC Flood Briefings
  - Gathered feedback from customers on briefing format in preparation for hurricane season. Tested new method of delivery. Favorable feedback.
  - Implemented new online delivery method. Very positive feedback received.
  - Sent briefings through TS Andrea
  - Supported WFO OKX briefings
  - Participated in PEMA & MEMA coordination calls through the event
- Nurture Nature Center Social Science Project
- Nurture Nature / NOAA (MARFC & PHI) “*Rising Waters*” Science on a Sphere project won the Association of State Flood Plain Managers National Award for Media/Outreach
- Provided office tours for visiting homeschoolers & County Emergency Managers
- Penn State University Weather Camp – gave office tours and flood safety demonstrations to 80 middle & high school students
- Conowingo Pond Management Workgroup – participated in annual meeting hosted by SRBC

#### 4th Quarter FY2013

##### CHPS Innovations

- CHPS
  - We continue to work with Deltares to resolve our PCRaster FFG issues
  - Stand-alone now running on our BUS
  - Beta-testing CHPS 4.0.1, provided input to ER HSD on CHPS training requirements

- Worked with WFO PHI, DRBC and Nurture Nature to help return stream gage to service at temporary location in Easton, PA during 2 year bridge repair
- GSSHA/GSFLOW webinar
- Observed NERFC remote access to CHPS training for their WFOs
- Familiarization visit to Susquehanna River Basin resulted in hydrologists noting a difference in river stage height measurement between a new stream gage & existing wire weight. Notified WFO SSH who will investigate & correct.
- Used a GIS-based method to re-compute the drainage areas of 3 forecast points. Found these values differed from the E-19s. Notified SSH.
- Created staffing template for high impact events as recommended by service assessment
- Assisted USGS NY WSC and SRBC in prioritizing the NY stream gage network
- Operational Readiness Exercise completed on back-up operations
- Distributed Hydrologic Modeling – participated in meeting with USDA & Penn State University
- Reworked forecast procedures for Jordan Creek at Allentown, PA after USGS control dam was suddenly removed and rating became invalid
- Implemented higher flood stages at Waverly, NY on the Susquehanna River
- Added supplemental stream gage to Hydro Time Series to help with loss of stage-flow relationship at Allentown, PA after USGS control dam was suddenly removed
- Added enhancements to digital forecast manual:
  - “Update RVF” – data display to monitor differences between observed forecast point stages and forecast states. This will help forecasters see if forecast updates are needed.
  - “% Bankfull” - compares observed and forecast with bank full. Will be helpful for the HMD to see the data users see on AHPS and situational awareness at shift-change time

#### **Ensemble/Uncertainty Initiatives**

- HEFS
  - Beta testing continues
  - With configuration assistance from NERFC; producing the RTi forecasts (initial-30 days, no mods, forecast length of 365 days, no Post processing) for 14 "local" basins in the Upper Delaware Basin
  - Generating traditional daily HEFS forecasts for 14 points in the Upper Delaware basin (headwater and downstream locations) which includes EnsPost and GraphGen
  - Participated in workshop
- TCIG – continued to participate in national team activities to improve the inland flood graphic
- MMEFS – participated in ER meeting to discuss future of MMEFS
- SLOSH Ensemble – created an ensemble 7 SLOSH run to support Washington DC river forecasts during tropical storms/hurricanes

#### **Forcing innovations (e.g. dual-pol, snow estimation, etc.)**

- Significant progress made on generating temperature grids to be used by distributed model
- Hurricane Season – attended SR Virtual Tropical DSS Workshop
- Attended 7th Annual NOAA Coastal Labs conference call on Hurricane Preparedness & Recovery
- 47 USGS DCP precipitation gages in Pennsylvania portion of Susquehanna River Basin discontinued
- Reviewed & provided recommendations to improve draft national AHPS QPF/QPE viewer
- Provided recommendations to modernization of HURREVAC
- Hurricane Sandy – attended North Atlantic Coast Comprehensive Study: Vulnerability/Exposure Assessment webinar

#### **Status of ongoing and new IWRSS innovations**

- Silver Jackets
  - Completed presentations and designed brochure & magnet for Harrisburg FIM outreach
  - Harrisburg FIM library posted to AHPS
  - Pennsylvania Silver Jackets Team was named Silver Jacket Team of the Year
  - Participated in virtual national Silver Jacket conference
  - Participated in monthly PA & VA and quarterly MD & NJ Silver Jacket Team meetings



- Attended National Hazard Mitigation Association Practitioner's Symposium
- RITT Forum – attended webinar on Event-based Verification & Evaluation of NWS Gridded Products: "The EVENT Tool"
- Shared HEC-RAS model with USACE & Washington DC Flood Risk Coordination Group to assist in generation of flood inundation maps for tidal Potomac. Shared model with Fairfax Co., VA and the University of Maryland.
- Water Forecasting Improvement Preparatory Project (WFIPP)
  - SCH is member of Data Archive Team
  - DOH & Hydrologist are members of Evaluation/Verification Team
  - HIC is member of the RFC Service Backup Team
- Ecological Forecasting – offered data & forecast support to VA DEQ for algae bloom issues on Shenandoah River
- Hosted meeting with USDA & Penn State University to discuss hydrologic models for nutrient runoff-fertilizer application project

### **Significant external engagement**

- Supported WFO BGM with their flood briefings during July 1-3 event
- Familiarization visits made by MARFC DOH & 3 hydrologists to: NCEP WPC, ERH, and WFOs BGM, LWX, PHI & OKX
- Reviewer of NOAA 2014 Undergraduate Scholarship applications
- ICPRB Drought Exercise – provided forecast support for 8-day annual drought exercise
- Penn State University – provided office tours to freshmen meteorology majors
- SCH co-chair of National WCM SCH Workshop
- Social Media - MARFC has highest Klout score of the 13 RFCs
- Hosted HPM Meeting with 7 WFOs and OHRFC. Positive feedback received. Action items identified.
- WFO LWX Hydro Partners – participated in annual meeting
- Shared internal web self-briefing program code with WFO BGM
- National Science Foundation – signed on to be collaborator on Penn State-Rutgers-DRBC proposal to NSF's Water Sustainability and Climate solicitation
- Nurture Nature
  - Social Science Project: Continued support. Met in Easton, PA with BGM & PHI. Identified several topics & formats for educational pieces
  - Science-on-a-Sphere (SoS): Reviewed draft scripts and provided flood outlook graphics to the Nurture Nature Center for their new SoS show on hurricanes

## FY2013 AHPS Activities for NERFC

**Management Lead:** David Vallee (HIC), Rob Shedd (DOH), Ed Capone (SCH)

**Objective:** Implement AHPS services in the Northeast River Forecast Center's area of responsibility

**Milestones:**

### FY13 Planned New Service Locations

Area of Service (River Basin)	# New Locations	Location Names (LIDs)	Service Type Provided	Planned Completion Quarter	Actual Completion Quarter	Notes
Thames	2	JCYC3 PUTC3	Prob. AHPS	FY12 Q3	FY13 Q3	Quinebaug River at Jewett City and Putnam, CT
Housatonic	1	BEAC3	Prob. AHPS	FY12 Q3		Naugatuck River at Beacon Falls, CT
Pawcatuck	3	WODR1, WSTR1, HOPR1	Prob. AHPS	FY13 Q4		Pawcatuck River at Wood River Junction, Westerly, and Hope Valley, RI

\*Service Types available: Probabilistic on AHPS web, SSHP-SAC, SSHP-API, Flood Inundation Mapping, Water Resources on Western Water web page, Probabilistic displayed only on RFC web page, Probabilistic delivered directly to partner (not on any web page)

### AHPS Service Location Summary

Time Frame	Probabilistic AHPS Web	Site Specific (SAC)	Site Specific (API)	Forecast Inundation Map	Water Resources Sites on W. Water Web Page	Probabilistic RFC Web Only	Other	Number Unique Locations
Q1	0	0	0	0	0	0	0	0
Q2	0	0	0	0	0	0	0	0
Q3	2	0	0	0	0	0	0	0
Q4	0	0	0	0	0	0	0	0
Total FY13	2	0	0	0	0	0	0	0
Overall Total	176*	1	57	0	0	0	0	0

\* Connecticut River @ Middletown, CT (MDDC3) discontinued FY12Q2 was added back to point total

### Accomplishments/Actions:

#### 1st Quarter FY2013

- **Forecast Points**
  - Several new forecast points in the Thames River basin have been incorporated into CHPS for testing. They will be implemented in AHPS soon.
  - Two additional forecast locations in the Croton/Kensico River system have been implemented in CHPS and data is being delivered to NYC and Riverside to support OST development. Although these are not currently planned for AHPS as there is not a real public forecast interest, ensembles are being generated and provided to NYCDEP. These locations include:
    - WBCN6 – West Branch Croton River at West Branch Reservoir near Carmel NY
    - NCRN6 – New Croton Reservoir near Croton-on-Hudson, NY
- **CHPS Innovations**
  - A remote Master Controller for NERFC has been set up at MARFC. Routine testing to begin in Jan
  - Working on procedures to allow WFO access to CHPS beginning in the next several months

- Implemented new basin schematics to support improved situational awareness within CHPS
- **Ensemble / Uncertainty Initiatives**
  - Development activities for MMEFS have continued to support a transition to operations in Jan 2013
  - Continuing work on HEFS beta development activities. Currently working on next round of hind casts for the Croton river system
- **Forcing Innovations**
  - Working on bringing in tidal forcing data from both RENCI and UMass-Dartmouth Gulf of Maine model to assess potential for improved boundary conditions for tidal reaches
- **Status of Ongoing IWRSS Innovations**
  - None
- **External Engagement**
  - Monthly water resources calls with WFO(s) and northeast water partners at the federal, state, and local level
  - Coordination meeting with USGS representatives from the New England and New York Water Science Centers held in Taunton in December
  - Conference call held with Deltares and RENCI to discuss the availability of the RENCI tidal model to support RFC operations
  - Hosted visit by Kevin Cwalina, NYC DEP, to allow him to gain familiarity with RFC operations

## 2<sup>nd</sup> Quarter FY2013

- **Forecast Points**
- No new forecast points implemented 2<sup>nd</sup> quarter
- **CHPS Innovations**
  - Remote MC at MARFC is working. Tested successfully against local client to ensure it is functioning properly. Next step is develop data feeds to support backup
  - ERH and 2 WFO(s) now have client access to the NERFC CHPS. Training has been provided to WFO(s) BOX and ALY. Plan is to spin up the remaining WFO(s) in the 3<sup>rd</sup> Quarter
  - Have begun plotting annual peak flows and FEMA return periods in CHPS Plot Overlays
  - Developed display showing bias of a variety of tidal boundaries being ingest to CHPS
- **Ensemble / Uncertainty Initiatives**
  - MMEFS was converted to an operational status in January. This has required additional tools to check output on a routine basis and edit as necessary
  - Continuing work on HEFS beta development activities. Croton system hindcasts have been completed. Completed historical run. Installed new HEFS1 and 2 servers.
  - Have begun populating the national Experimental Long Term Outlook pages with weekly AHPS ESP output. Had to modify nationally provided scripts to handle flow time series instead of the default river stage
- **Forcing Innovations**
  - Met with U.Massachusetts-Darmouth and Woods Hole staff in regard to their ocean modeling system for the Gulf of Maine and their ability to support it long term
- **Status of Ongoing IWRSS Innovations**
  - Two projects involving hydrodynamic modeling for Lake Champlain
    - A review of a proposed work plan drafted by the IJC was conducted focusing on potential NWS and NERFC work areas
    - Discussions were held with NOHRSC regarding how to move forward with additional modeling tools for the lake to better handle wind issues
- **External Engagement**
  - Bi-weekly calls during spring snowmelt to review conditions and spring outlook

- Hosted meeting with Diane Mas, currently an engineer with Fuss and O'Neil and a former NERFC staff member who was interested in learning more about NERFC products and capabilities with CHPS

### 3<sup>rd</sup> Quarter FY 2013

- **Forecast Points]**
  - Quinebaug River at Jewett City CT (JCYC3) – new AHPS point
  - Quinebaug River at Putnam CT (PUTC3) – new AHPS point
  - Connecticut River at Middle Haddam CT (MHDC3) – currently replaces Middletown CT. Tidal influence therefore no probabilistic forecasts are being produced.
  - Two forecast points have been established to support NYCDEP operations but are not publicly issued due to insufficient data
    - New Croton Reservoir (NCRN6)
    - West Branch Croton Reservoir (WBCN6)
- **CHPS Innovations**
  - Providing access to an additional 4 WFOs to NERFC CHPS in early August
  - CHPS 3.0.1 was installed in late June
  - Beginning to investigate possibility to bring in wind data into CHPS for Lake Champlain and implement some “Rules of Thumb” that have been developed by WFO BTV to objectively adjust forecasts on lake based on wind
  - Have set up CHPS test & development system (chps789) using some retired hardware
- **Ensemble / Uncertainty Initiatives**
  - Work is ongoing to convert MMEFS to be generated by GraphGen
  - Set up a mini-Ensemble for display purposes in CHPS of raw model precipitation forcing from ECMWF, GFS, NAM, SREF mean, and HPC QPF
- **Forcing Innovations**
  - U.Mass-Dartmouth NECOFS & ESTOFS grids available in CHPS for tidal forcing in addition to ET-Surge time series from WFO BOX. Will likely convert to using ESTOFS as primary.
  - Procedures have been setup to bring in SLOSH mini MEOW rexx files into CHPS from NHC
- **Status of Ongoing IWRSS Innovations**
  - Participated in IWRSS Stakeholder Engagement Meeting for the Hudson River in NYC
- **External Engagement**
  - New Brunswick Canada – working with NB as they set up FEWS for their operations during the next year. Receiving pixml files from them and importing those to CHPS. Have assisted them with understanding mods and how our configuration is set up.
  - Monthly Water Resource calls and extra briefings to support flood concerns in June and July
  - Stevens Institute of Technology has received a contract to study flood inundation along the Hudson River. They are attempting to set up FEWS to support their study. We have provided our configuration and dataStores from Irene.

### 4<sup>th</sup> Quarter FY2013

- **Forecast Points**
  - Implementation of forecast points in Pawcatuck River Basin delayed due to USGS funding issues with one of the gages. Funding has been restored and implementation will be rescheduled in FY14 Q1.
- **CHPS Innovations**
  - All WFOs except OKX now have remote access to CHPS
- **Ensemble / Uncertainty Initiatives**

- MMEFS will be converted to using GraphGen following implementation of CHPS4 in November
- Almost all work for HEFS implementation for NYC has now been completed. A few minor pieces requested by RTi are still being addressed
- **Forcing Innovations**
  - Will be converting from 5km RTMA to 2.5km RTMA in Q1 or Q2 2014
- **Status of Ongoing IWRSS Innovations**
  - DOH is member of the Water Forecasting Improvement Preparatory Project (WFIPP) Evaluation & Verification Team
  - SCH is member of the WFIPP Modeling Testbed Team
- **External Engagement**
  - Hosted meeting with New England Corps of Engineers to review current data requirements and data exchange opportunities
  - Hosted forecaster visits from WFO CAR and WFO ALY for familiarization with RFC operations
  - Visited BUF to work on CHPS access, rating curve exchanges, and other coordination tasks
  - Met with BTV and Quebec Hydro personnel to review forecasting in the Richilieu River basin
  - U.Mass-Dartmouth student developed a series of outreach material for each of the major river basins in NERFC during the summer

## FY2013 AHPS Activities for OHRFC

**Management Lead:** Trent Schade (HIC), Vacant (DOH), Jim Noel (SCH)

**Objective:** Implement AHPS services in the Ohio River Forecast Center's area of responsibility

**Milestones:**

### FY13 Planned & Unplanned New Service Locations

Area of Service (River Basin)	# New Locations	Location Names (LIDs)	Service Type Provided	Planned Completion Quarter	Actual Completion Quarter	Notes
White	1	DREI3	Prob. AHPS	FY12 Q4	FY13 Q1	Driftwood River at Hendricks Ford Bridge, IN. Proposed USGS FIMI project
White	5	ACTI3 MOOI3 AMIT3 STPI3 CATI3	SSHP-SAC	NP	FY13 Q3 FY13 Q4	Buck Creek at Acton, IN White Lick Creek at Mooresville, IN Youngs Creek at Amity, IN Flatrock River at St. Paul, IN Mill Creek near Cataract, IN
Wabash	3	RGVI3 NPLI3 FINI3	SSHP-SAC	NP	FY13 Q3 FY13 Q4	Mississinewa River at Mooresville, IN Sugar Creek at New Palestine, IN Big Raccoon
Muskingum	1	LDVO1	SSHP-SAC	FY12 Q4	FY13 Q4	Black Fork Mohican River at Loudonville, OH
Cumberland	1	HLBK2	SSHP-SAC	NP	FY13 Q4	South Fork Little River at Hopkinsville, KY - Bypass
Cumberland	1	HLBK2	FIM	NP	FY13 Q4	South Fork Little River at Hopkinsville, KY - Bypass
Kentucky	1	LPTK2	Prob. AHPS	FY12 Q4	Not Completed	Kentucky River at Lockport, KY

\*Service Types available: Probabilistic on AHPS web, SSHP-SAC, SSHP-API, Flood Inundation Mapping, Water Resources on Western Water web page, Probabilistic displayed only on RFC web page, Probabilistic delivered directly to partner (not on any web page)

### AHPS Service Location Summary

Time Frame	Probabilistic AHPS Web	Site Specific (SAC)	Site Specific (API)	Forecast Inundation Map	Water Resources Sites on W. Water Web Page	Probabilistic RFC Web Only	Other	Number Unique Locations
Q1	1	0	0	0	1	0	0	0
Q2	0	0	0	0	0	0	0	0
Q3	0	5	0	0	0	0	0	0
Q4	0	5	0	1	0	0	0	0
Total FY13	1	10	0	1	1	0	0	0
Overall Total	281	93	2	8	281	0	0	0

## Accomplishments/Actions:

### 1<sup>st</sup> Quarter FY2013

- **CHPS Innovations**
  - Implemented Newark Project with 1-hour Unit Hydrograph in CHPS-FEWS framework
  - Implemented HEC-RAS I-70 project within CHPS-FEWS framework
- **Ensemble/Uncertainty Initiatives**
  - Implemented NAEFS 16-day with CHPS-FEWS framework
  - Implemented new 90-day ESP product for seasonal outlooks in concert with CRH
- **Forcing Innovations/Initiatives**
  - None
- **Status of ongoing and new IWRSS innovations:**
  - *HEC-RAS Ohio River Community Project with USACE Great Lakes and Ohio River Division (LRD)*
    - Working on extending tributaries further up Green, Kentucky and Licking Rivers, plan Lockport as a lower Kentucky HEC-RAS project in January
    - Working with USGS and ODOT for completing the I-70/Newark project
- **External engagement**
  - Drought
    - USACE LRD Olmstead low flow drought coordination call
    - Ohio State University Drought Outlook for agriculture
    - CPC Drought Coordination Call
  - Silver Jackets Activities
    - Coordination Calls: Ohio, Pennsylvania, Indiana, Virginia
    - Meeting: Kentucky
  - Climate
    - NCDC State of the Climate webinar
    - Midwest Climate Center visit to OHRFC for coordination meeting
    - Midwest Climate Center coordination call
    - Ohio River Basin Climate Change Pilot Project coordination call
    - ORSANCO Climate Change meeting and presentation
    - Indiana Crop Advisors Climate Conference – presenters
  - Training and Outreach
    - Butler County Water Fest
    - Fairbanks Middle/High School Outreach for NWA Award presentation
    - Little Miami River Watershed Festival
    - Carillon Park Outreach for 1913 flood anniversary
    - GIS training in Columbus, OH
    - NWSChat LIVE training for Partners
    - NOAA Winter Aware MMEFS coordination article
    - Provided national training on Site Specific Hydrologic Predictor (SSHP)
  - Partner Flood Coordination
    - Cumberland River Basin SRH coordination call
    - USGS Indiana coordination meeting
    - Huntington and Pittsburgh Waterways meeting
    - Upper Mississippi River Tri-Agency meeting webinar
    - Miami Conservancy District 1913 Flood coordination meeting
    - Marietta & Newark flood inundation mapping meeting with USGS
    - OHRFC's Seasonal Outlook coordination call
    - NOHRSC snow coordination call
    - NWS/USACE/USGS Fusion team call
    - MMEFS ERH coordination call
    - NWS Headquarters Long-Range Flood Outlook coordination call

## 2<sup>nd</sup> Quarter FY2013

- **CHPS Innovations**
  - Implemented expanded version of Ohio River Community HEC-RAS model
  - Implemented 45-day Climate Forecasting System (CFS) outlook for Smithland inflows workflow
- **Ensemble/Uncertainty Initiatives**
  - Implemented national AHPS product (90-day ESP) for seasonal outlooks to partners
- **Forcing Innovations/Initiatives**
  - None
- **Status of ongoing and new IWRSS innovations:**
  - *HEC-RAS Ohio River Community Project with USACE Great Lakes and Ohio River Division (LRD)*
    - Added Kentucky River into project
    - Added new backwater forecast point at Lockport, KY
    - Completed development work & began issuing backwater forecast point for I-70 at Newark, OH in concert with USGS WSC OH flood inundation mapping project
- **External engagement**
  - Drought
    - USACE LRD Olmstead low flow drought coordination calls
    - Ohio State University Southwest Corn Growers Meeting - climate outlook presentation
    - CPC Drought Coordination calls
    - CRH Drought Coordination calls
    - Purdue Farm Meeting – climate outlook presentation
  - Silver Jackets Activities
    - Coordination Calls: Ohio, Pennsylvania, Indiana, Virginia
    - Meeting: Kentucky
  - Climate
    - OSU Crop Advantage 2013 – Climate/Hydrology outlook presentation
    - Ohio River Basin Climate Change Pilot Project coordination call
    - CPC Drought coordination call
    - Ohio State University Climate/Hydrology Outlook coordination calls
  - Training and Outreach
    - Carillon Park 1913 Flood exhibit press conference
    - Provide NWSchat national training webinar to USGS & USACE partners
    - Provided Site Specific Hydrologic Predictor (SSHP) training to WFO IND
    - Ohio State University 1913 Flood presentation
    - Marietta Times interview on NWS Flood Forecasting
    - Ohio Severe Weather Symposium – 1913 Flood presentation
    - Hamilton, OH 1913 Flood simulation provided
    - CME Group Open Markets interview
  - Partner Flood Coordination
    - USACE LRD Olmstead coordination calls
    - Flood Potential coordination calls with WFO Nashville & USACE LRN
    - Cumberland and Tennessee River flood navigation call
    - USGS Kentucky coordination call
    - USGS Indiana Midwest Team Meeting
    - NOHRSC snow coordination calls
    - Ohio DOT & USGS I-70 Newark Project status meeting
    - ERH/CRH flood inundation mapping coordination call
    - Provided Mississippi drainage spring freshet flood outlook webinar w/ WFO(s)
    - Participated in National Flood Outlook press conference



### **3<sup>rd</sup> Quarter FY2013**

- **CHPS Innovations**
  - Switched to CHPS-FEWS for SAC-SMA states for SSHP
  - Community HEC-RAS Partners Coordination Meeting at USACE LRD
  - Low flow 7Q10 levels/stages delivered to WFOs
- **Ensemble/Uncertainty Initiatives**
  - None
- **Forcing Innovations/Initiatives**
  - None
- **Status of ongoing and new IWRSS innovations**
  - NWS National Experimental Long-Lead AHPS Outlook webinar
  - Implemented automated Twitter/Facebook social media message for action to record stage levels
- **External engagement**
  - Drought
    - CPC Drought Coordination Calls
    - 25x25 Alliance interview on 2012 drought impacts
  - Silver Jackets
    - Ohio, Kentucky, Indiana, and Pennsylvania Silver Jackets Coordination Calls
  - Climate
    - Ohio State University Climate/Hydro Outlook coordination call/article
    - Purdue University Climate/Hydro Outlook coordination article
    - CPC Climate Outlook Calls
  - Training and Outreach
    - Dayton STEM TechFest
    - USGS Midwest Flood Science Technical Team presentation AHPS/Forecast Process
  - Partner Flood Coordination
    - USACE LRD Olmstead Coordination Calls
    - USGS Midwest Flood Mapping Call
    - OHRFC Partners Flood Coordination Call/Briefings
    - WFO CLE Flood Coordination Calls
    - USACE LRN Wolf Creek Dam Coordination Call and Support
    - WFO IND Flood Coordination Calls
    - USACE LRD Flood Coordination Calls
    - Tennessee and Cumberland Flood Coordination Call
    - USACE Cumberland Navigation Flood Coordination call
    - WFO Nashville Flood Potential Coordination Call
    - Nimishillen Creek Coordination Meeting
    - USGS conference call

### **4<sup>th</sup> Quarter FY2013**

- **CHPS Innovations**
  - Implemented Climate Forecasting System (CFS) 45-day for Smithland ensemble flow outlooks
  - Ohio River Basin Climate Change Project in CHPS continued. Completed stream flows for periods from 1952 to 2099. Work being finalized on temperatures, rainfall and snow water equivalent.
  - New flood unit hydrograph installed at Tiffin, TFFO1
  - New 6-hr recommended and 1-hr flood unit hydrographs developed for Great Lakes drainage
- **Ensemble/Uncertainty Initiatives**
  - Coordinating with NERFC on plans to end use of R and Grass
  - MMEFS Coordination Call

- **Forcing Innovations/Initiatives**
  - Great Lakes Environmental Research Lab (GLERL) Coordination Meeting
- **Status of ongoing and new IWRSS innovations:**
  - Water Resources Committee ORSANCO Meeting
  - Great Lakes Environmental Research Lab (GREL) Coordination Meeting
  - Ohio River Basin Alliance Meeting, Louisville, KY
  - Water Forecasting Improvement Preparatory Project (WFIPP)
    - SCH is member of Data Archive Team
    - HIC is member of the Integrated Information Team
- **Significant external engagement**
  - Climate
    - Ohio State University Climate/Hydro Outlook coordination call/article
    - Purdue University Climate/Hydro Outlook coordination article
    - CPC Seasonal Outlook coordination call
    - CR Climate call
    - NWS CR Climate Review and Outlook call
    - Ohio River Basin Climate Change Meeting, Louisville, KY
  - Silver Jackets Coordination Meetings/Calls
    - Ohio, West Virginia, Pennsylvania, Virginia, Kentucky, Tennessee, Indiana
    - National Silver Jackets Meeting – Training Webinar
  - Outreach and Training
    - Coordination Newsletter released
    - Site Specific Hydrologic Prediction (SSHPP) coordination call with WFO IND
    - GLERL coordination meeting – NWS River Forecast Process Training was provided
    - Confluence Article on I-70 project
    - Office visits to WFO(s) DTX, IWX, RLX, RNK, JKL, PAH, CTP & MARFC
    - Hosted WFO(s) IND, JKL & CTP visits
    - Hosted USACE Louisville District (LRL) visit
    - USGS Indiana Stakeholder Meeting
  - Partner Flood Coordination
    - Olmstead coordination call with USACE Great Lakes & Ohio Division (LRD)
    - Flood coordination calls with USACE LRD & Nashville District (LRN)
    - Flood coordination calls with WFO(s) Cleveland & Nashville
    - Tennessee/Cumberland navigation high flow coordination call
    - Flood forecasting call with City of Columbus

## FY2013 AHPS Activities for ABRFC

**Management Lead:** HIC, DOH, SCH

**Objective:** Implement AHPS services in the Arkansas-Red River Forecast Center's area of responsibility.

**Milestones:**

### FY13 Planned New Service Locations

Area of Service (River Basin)	# New Locations	Location Names (LIDs)	Service Type Provided *see list below	Planned Completion Quarter	Completion Quarter	Notes
	0					

\*Service Types available: Probabilistic on AHPS web, SSHP-SAC, SSHP-API, Flood Inundation Mapping, Water Resources on Western Water web page, Probabilistic displayed only on RFC web page, Probabilistic delivered directly to partner (not on any web page)

### AHPS Service Location Summary

Time Frame	Probabilistic AHPS Web	Site Specific (SAC)	Site Specific (API)	Forecast Inundation Map	Water Resources Sites on W. Water Web Page	Probabilistic RFC Web Only	Other	Number Unique Locations
Q1	0	0	0	0	0	0	0	0
Q2	0	0	0	0	0	0	0	0
Q3	0	0	0	0	0	0	0	0
Q4	0	0	0	0	0	0	0	0
Total FY13	0	0	0	0	0	0	0	0
Overall Total (FY2000-2013)								

### Accomplishments/Actions:

<sup>4th</sup> Quarter FY2013

#### CHPS Innovations

- Completed 15 calibrations into CHPS

#### Ensemble/Uncertainty Initiatives

- Added the Arkansas River to Pueblo Dam in HEFS
- Added almost the entire NMWTX forecast group to HEFS.

#### Forcing innovations

- None.

#### Status of ongoing and new IWRSS innovations

- None

### **Significant external engagement**

- Bill Lawrence and James Paul visited US Representative Cotton's office in Hot Springs, AR and provided briefing
- ABRFC hosted a meeting with US Representative Jim Bridenstine (OK) and staff
- Jeff McMurphy attended USACE Tulsa District Change of Command Ceremony
- ABRFC management participated in 3-day Interagency Water Management Conference (via webinar)
- Tony Anderson and James Paul provided a webinar to CR, SR and WFOs in ABRFC area concerning changes in QPF used in forecasts and a procedural change in daily forecast points issuance
- Jeff McMurphy attended Red River Valley Authority regional meeting in Durant, OK and gave a presentation
- James Paul and Eric Jones visited USACE Tulsa District on separate days for job shadowing to watch forecasting section
- James Paul did radio interview with Emporia, KS radio station concerning recent and ongoing flooding
- ABRFC staff provided forecasts with 5 days of QPF to LMRFC for fishing tournament support
- Bekki Harjo visited WFO LZK, WFO SHV and USACE Little Rock District and gave presentations to each office
- Tony Anderson visited WFO AMA, WFO DDC, WFO PUB and Kansas Water Office and gave presentations to each office
- Provided FEMA Region 7 with multi-day precipitation maps for heavy rainfall event in Missouri via Central Region request
- Hosted WFO SGF Service Hydrologist for a three day visit and set up/attended meeting at USACE Tulsa District to meet with her
- Hosted three forecasters from WFO ICT for RFC familiarization trip for two days
- Coordinated with USBR office in Oklahoma City to set up potential meeting at their office
- Mike Pierce visited several current and potential river forecast points with WFO OUN Service Hydrologist
- Jeff McMurphy attended Cheney Reservoir dam break exercise hosted by USBR
- Jeff McMurphy attended USACE Tulsa District table top exercises at Hula Lake and Canton Lake

## FY2013 AHPS Activities for LMRFC

**Management Lead:** Suzanne Van Cooten, HIC

**Objective:** Implement AHPS services in the Tennessee River Basins of the Lower Mississippi River Forecast Center's area of responsibility.

**Milestones:**

### FY13 Planned New Service Locations

Area of Service (River Basin)	# New Locations	Location Names (LIDs)	Service Type Provided *see list below	Planned Completion Quarter	Actual Completion Quarter	Notes
Pascagoula	0	HATM6	FIM-Static	Q2	Q2	
Toccoa	1	BRDG1	Prob. AHPS	Q2		**
French Broad	1	FLCN7	Prob. AHPS		Q3	
Hiawassee Holston Tellico	4	CHAN7 NOTG1 VSTV2 TLRT1	Prob. AHPS	Q3		**
Holston Ocoee Tuckasegee Clinch	5	OCAT1 FONN7 WTGT1 SHDT1 NRST1	Prob. AHPS	Q4	Q4	** DUGT1 substituted for OCAT1 and WTGT1

\*Service Types available: Probabilistic on AHPS web (Prob. AHPS), SSHP-SAC, SSHP-API, Flood Inundation Mapping (FIM), Water Resources on Western Water web page (WR/WW), Probabilistic displayed only on RFC web page(Prob. RFC), Probabilistic delivered directly to partner (not on any web page)

\*\*Planned implementation numbers adjusted downward due to FY13 staffing shortages that have delayed internal calibration efforts.

### AHPS Service Location Summary

Time Frame	Probabilistic AHPS Web	Site Specific (SAC)	Site Specific (API)	Flood Inundation Map	Water Resources Sites on W. Water Web Page	Probabilistic RFC Web Only	Other	Number Unique Locations
FY13 Q1								
FY13 Q2	0			1				
FY13 Q3	1							
FY13 Q4	4							
Total FY13	5	0	0	0	0	0	0	
Overall Total (FY2000-2013)	239	24	4	7	0	0	0	256

**Accomplishments/Actions:**

#### 4<sup>th</sup> Quarter FY2013

- **CHPS Innovations** (e.g. any extensions, configurations, displays, adaptors, collaborations, community models, etc.)
  - On-going discussions with the Tennessee River Valley Authority (TVA) on their transition to CHPS and future collaborations with modeling, calibration and development. Extensive effort to coordinate basin delineation and hydrologic data collaboration efforts between TVA and LMRFC.
  - Katelyn Costanza continues development of a Delft 3-D model for the Pascagoula river system to evaluate feasibility for implementation into operations using CHPS adapter.
  - Katelyn Costanza continues collaboration with OHD to verify SAC-HTET model using 2012 BKNM6 data.
  - Katelyn Costanza implementing surge ensemble forecasts within CHPS environment for the Mississippi River and coastal river forecasts.
  - Mississippi River forecasting suite streamlined, so all but one product now issued from CHPS, significantly reducing margin of forecaster error and number of software packages necessary to provide products and services.
  
- **Forcing innovations** (e.g. dual-pol, snow estimation, etc.)

LMRFC staff members completed Climate Variability and Change Virtual course
  
- **Status of ongoing and new IWRSS innovations:** Novel collaborations and initiatives in science, technology and stakeholder engagement demonstrating federal partners working together, leveraging resources and providing efficient and effective government (e.g., seamless data exchange, system interoperability and data synchronization, summit to sea modeling, flood inundation mapping, geo-intelligence improvements, common operating picture, etc.). Examples of innovations include the WGRFC web portal, OHRFC HEC-RAS inundation mapping, CNRFCs adaption of RES-SIM.
  - Continue discussions with NASA Stennis, NGI, and affiliated groups for coastal total water level prediction collaboration with LMRFC.
  - Continue development of USACE 16 Day QPF (NAEFS) forecast product.
  - Continue on-going decision support service development for excessive rainfall events, including partnership with NSSL and LMRFC WFOs.
  - Continue collaboration with OHD on Distributed Hydrologic Model Threshold Frequency project for the LMRFC area. DHMTF running in real-time with an evaluation phase with WFOs LCH, JAN, SGF, MEG and RNK.
  - Continue discussions with New Orleans Corps on water monitoring and hardening of gages. (HSDRRS)
  - LMRFC provided feedback on guidelines for AHPS Flood Inundation Mapping requirements

- LMRFC participating on the WFIPP RFC Backup, Data Archive, and Modeling Testbed teams.
- **Significant external engagement** (e.g., Silver Jackets, Fusion Team, Congressional activities, Impact-based Decision Support Services (IDSS), etc.)
  - Suzanne Van Cooten continues collaboration and coordination with Northern Gulf Institute partners including LSU and Mississippi State University to leverage expertise in hydrologic and hydrodynamic modeling.
  - July 8-11, Katelyn Costanza and Scott Lincoln toured Memphis USACE operations and gages. In-depth discussions on expansion of the Hydraulic Community Model and improvements to the Mississippi River forecasts.
  - July 16-18, SERFC's Paula Cognitore visited LMRFC for HEC-RAS model training
  - July 16-18, LMRFC participated in the Interagency Water Management Meeting.
  - July 26, Representative Steve Scalise (R) toured LMRFC operations.
  - July 29-August 2, David Schlotzhauer shadowed LCH WFO's Jonathan Brazzell.
  - August 6-8, David Schlotzhauer provided Incident Command Service (DSS) training for federal employees at Michoud, LA.
  - August 20-21, LMRFC management team participated in USACE meetings affiliated with the General's river tour.
  - August 27, SERFC's Jonathan Atwell shadowed David Welch on how to better implement AWIPS 2.
  - September 9, Scott Lincoln and David Schlotzhauer visited SWBNO's Tom Miller.
  - September 12, Katelyn Costanza and David Welch hosted by LSU School of Coast and Environment and the Louisiana Sea Grant, at LSU for potential ADCIRC/Delft3D infusion to improve operational forecasts and services especially for coastal storm events.
  - September 25-26, Katelyn Costanza participated in the New Orleans ASCE Conference.
  - On-going job shadowing by Naval enlisted man Ryan Koepke.
  - Expanded dam safety warning hierarchy to include the State of Louisiana and working to build partnership with Louisiana Department of Transportation.
  - Attended meetings/conference calls with Mississippi and Tennessee Silver Jackets and Camo Jackets programs.
  - Continued collaboration with representatives from the St. Tammany Parish Engineering Department along with the Navy Research Laboratory's Lead ADCIRC/Hydraulic Modeler about a united, collaborative effort to develop a hydraulic model for the lower Pearl River,

North shore of Lake Pontchartrain, and coastal communities impacted by storm surge. Discussions include augmenting real-time data gaging network to improve WFO and RFC situational awareness.

- Continued collaboration with USACE New Orleans District, NOS, and Levee Boards to develop a prioritized list of locations for hardened gauge locations to collect meteorological and water level observations in the New Orleans and Lake Pontchartrain/Rigolets area



## FY2013 AHPS Activities for SERFC

**Management Lead:** HIC, DOH, SCH

**Objective:** Implement AHPS services in the Southeast River Forecast Center's area of responsibility.

**Milestones:**

### FY13 Planned New Service Locations

Area of Service (River Basin)	# New Locations	Location Names (LIDs)	Service Type Provided *see list below	Planned Completion Quarter	Completion Quarter	Notes
St Johns	4	ASTF1 DLAF1 SNFF1 GENF1 COCF1	Probabilistic	4 <sup>th</sup>	4th	Added COCF1 instead of LKOF1 inflow.
Lake Okeechobee	1	LKOF1	Probabilistic	4 <sup>th</sup>		
Apalachicola	2	SWEG1 AUSG1	Enhanced- FIM		2nd	

\*Service Types available: Probabilistic on AHPS web, SSHP-SAC, SSHP-API, Flood Inundation Mapping, Water Resources on Western Water web page, Probabilistic displayed only on RFC web page, Probabilistic delivered directly to partner (not on any web page)

### AHPS Service Location Summary

Time Frame	Probabilistic AHPS Web	Site Specific (SAC)	Site Specific (API)	Forecast Inundation Map	Water Resources Sites on W. Water Web Page	Probabilistic RFC Web Only	Other	Number Unique Locations
Q1	0	0	0	0	0	0	0	0
Q2	0	0	0	2	0	0	0	0
Q3	0	0	0	0	0	0	0	0
Q4	5	0	0	0	0	0	0	0
Total FY13	5	0	0	2	0	0	0	0
Overall Total (FY2000-2013)	269							

**Accomplishments/Actions:**

4<sup>th</sup> Quarter FY2013

### CHPS Innovations

- AWIPS 2 was installed and currently working through all of the issues with CHPS and our other nationally and locally supported software.
- Mark Love continues to work on CHPS produced graphics to replace our antiquated GIS machine.

## **Ensemble/Uncertainty Initiatives**

- Working to make ESP an automated process within CHPS.

## **Forcing innovations**

## **Status of ongoing and new IWRSS innovations**

## **Significant external engagement**

- Had numerous WFO familiarization visits. These included visits from Morehead City, NC, Columbia, SC, and Raleigh, NC.
- Duke Power came for a coordination visit. We discussed exchange of information and coordinated forecast needs.
- Jeff Dobur Visited WFO Jacksonville and WFO Tallahassee.
- Reggina Cabrera visited the Corps of Engineers, Jacksonville District.
- Jonathan Atwell visited LMRFC in Slidell and worked with the USACE in Mobile, AL.

## FY2013 AHPS Activities for WGRFC

**Management Lead:** Tom Donaldson

**Objective:** Implement AHPS services in the West Gulf River Forecast Center's area of responsibility.

**Milestones:**

### FY13 Planned New Service Locations

Area of Service (River Basin)	# New Locations	Location Names (LIDs)	Service Type Provided *see list below	Planned Completion Quarter	Completion Quarter	Notes
Pecos River	15	PUEN5 ACMN5 DARN5 LATN5 ATSN5 CSBN5 CPDN5 MLGN5 RBFN5 SPCT2 SFIT2 PDAT2 LTRT2 SKMT2 FAFT2	Prob. AHPS		Q4	

\*Service Types available: Probabilistic on AHPS web, SSHP-SAC, SSHP-API, Flood Inundation Mapping, Water Resources on Western Water web page, Probabilistic displayed only on RFC web page, Probabilistic delivered directly to partner (not on any web page)

### AHPS Service Location Summary

Time Frame	Probabilistic AHPS Web	Site Specific (SAC)	Site Specific (API)	Forecast Inundation Map	Water Resources Sites on W. Water Web Page	Probabilistic RFC Web Only	Other	Number Unique Locations
FY13 Q1	0	0	0	0	0	0	0	0
FY13 Q2	0	0	0	0	0	0	0	0
FY13 Q3	0	0	0	0	0	0	0	0
FY13 Q4	15	0	0	0	0	0	0	0
Total FY13	15	0	0	0	0	0	0	0
Overall Total (FY2000-2013)								

**Accomplishments/Actions:**

### **CHPS Innovations**

- Served as a beta test site for FEWS release 2013.01.
- Significantly reduced the size of our central database and local data stores by utilizing “Temporary” timeseries and reducing the number of forecasts retained.

### **Ensemble/Uncertainty Initiatives**

#### **Forcing innovations**

#### **Status of ongoing and new IWRSS innovations**

- WGRFC continues collaborations with the International Boundary and Water Commission (IBWC) and CONAGUA (National Water Commission of Mexico) in building a bi-national, data warehouse containing water resources data and forecast information on the Rio Grande/Bravo basin. WGRFC is currently working on a proposal to partner with IBWC and CONAGUA to re-delineate and recalibrate modeled watersheds in the Rio Grande basin, with the goal of improving hydrologic simulations and forecasts across all flow regimes.
- Continue participation in the development phase of the North American Climate Services Partnership Rio Grande/Bravo Pilot Project. The RBG Pilot Project seeks to build bilateral collaboration to enhance climate and drought-related data and services in order to improve water management decisions in the Rio Grande/Bravo Basin.
- WGRFC in partnership with IBWC/CILA, Mexican authorities, and local NWS WFOs, accepted delivery from the contractor of FIM libraries for the Rio Grande at Presidio/Ojinaga and at Colombia Bridge. This is a continuation of a bi-national cooperative project between NWS, IBWC/CILA and CONAGUA and follows the completion of initial FIM libraries at 4 previous locations on the Rio Grande. The 2 new libraries should be placed on AHPS pages in FY14 Q1.

#### **Significant external engagement**

- Providing seasonal video webinars for the USACE Fort Worth and Galveston Districts that focus on mid-range climate outlooks and potential impacts on water management decision and reservoir operations. USGS and other WGRFC primary partners are also invited to attend.
- WGRFC hosted the 2013 NWS/IBWC Annual Meeting, bringing together staff from NWS SRH and SR field offices, the IBWC, USGS, and USACE. The focus of the meeting included improving the collection and sharing of observational data in the Rio Grande basin, especially from Mexico, and

developing collaborative modeling projects to improve water forecasting.

- WGRFC participated in the USACE Southwest Division 2013 Hurricane Exercise. Helped in the development of the exercise narrative.
- WGRFC participated in the 2013 Federal Interagency Meeting, hosted by the USGS Texas Water Science Center. Presented on interagency cross-training initiatives and collaborative projects.
- WGRFC has held partner meetings with various river authorities in the region. Main topics of discussion have been operations in the face of ongoing drought, and WGRFC continues to provide longer range forecasts to assist the Brazos River Authority in meeting its required water deliveries to water rights holders in the Brazos River basin.
- WGRFC continues to provide event-based briefing emails and graphics to partners during significant hydromet events in the WGRFC region.

## FY2013 AHPS Activities for CBRFC

**Management Lead:** Michelle Stokes, HIC; John Lhotak, DOH; Kevin Werner SCH

**Objective:** Implement AHPS services in the Colorado Basin River Forecast Center's area of responsibility.

**Milestones:**

**FY13 Planned New Service Locations**

Area of Service (River Basin)	# New Locations	Location Names (LIDs)	Service Type Provided *see list below	Planned Completion Quarter	Completion Quarter	Notes

\*Service Types available: Probabilistic on AHPS web, SSHP-SAC, SSHP-API, Flood Inundation Mapping, Water Resources on Western Water web page, Probabilistic displayed only on RFC web page, Probabilistic delivered directly to partner (not on any web page)

**AHPS Service Location Summary**

Time Frame	Probabilistic AHPS Web	Site Specific (SAC)	Site Specific (API)	Forecast Inundation Map	Water Resources Sites on W. Water Web Page	Probabilistic RFC Web Only	Other	Number Unique Locations
Q1								
Q2								
Q3								
Q4								
Total FY13								
Overall Total (FY2000- 2013)	84	0	0	0	149	7		

**Accomplishments/Actions** (on each of the following topics that apply):

**1st Quarter FY2013**

- **CHPS Innovations**

- Continue work with University of Colorado on weather generator to feed ESP (MAPP funded project with Dr Rajagopalan).
- Beta testing new FEWS version.
- Beta testing model calibration within FEWS
- Beta testing HEFS in FEWS
- **Ensemble/Uncertainty Initiatives**
  - Continue work with University of Massachusetts to develop a decision making tool for Public Utilities using ESP. Note: In order for this project to be successful, we need reforecast capabilities in HEFS.
  - Providing ESP traces to partners and stakeholders for additional points throughout the basin. Partners are finding new ways to use ESP traces to make decisions.
  - Developed new visualization tools to spatially look at ESP 10/50/90 percent probabilities of water supply volume in the basin.
  - Running ESP daily.
- **Forcing innovations**
  - CBRFC is ingesting SNODAS and MODSCAG snow grids into CHPS for qualitative uses. We also built tools to look at differences between those grids and the SWE and areal snow cover in SNOW 17 to highlight areas of potential discrepancies. Work continues on analyzing past events and gridded snow information from various sources (NOHRSC, JPL, etc.) to develop operational procedures to improve snow modeling.
- **Status of ongoing and new IWRSS innovations:**
  - The USBR is developing a mid-term operations model (MTOM) to provide probabilistic outlooks of its major reservoirs on the Colorado River system to stakeholders. The MTOM will be used in parallel to the existing model (24 month study) which is run monthly and extends 24 months into the future. Unlike the existing model, the MTOM is based on CBRFC ESP forecasts. USBR and CBRFC have worked together to develop the connectivity between the two modeling system. In the near future, CBRFC intends to develop HEFS based 24 month ensemble forecasts to support the MTOM.
- **Significant external engagement**
  - Began monthly water supply webinars for the season.

## 2nd Quarter FY2013

- **CHPS Innovations**

- Continue work with University of Colorado on weather generator to feed ESP .
- Completed Beta testing of latest FEWS version.
- Wrapped up Beta testing model calibration within FEWS
- Beta testing HEFS in FEWS
- **Ensemble/Uncertainty Initiatives**
  - Continue providing ESP traces to partners and stakeholders for additional points throughout the basin. Partners are finding new ways to use ESP traces to make decisions.
  - Running ESP daily.
- **Forcing innovations**
  - Continue ingesting SNODAS and MODSCAG (from NASA and JPL) snow grids into CHPS for qualitative uses during the melt season.
- **Status of ongoing and new IWRSS innovations:**
  - See Q1.
- **Significant external engagement**
  - Continue monthly water supply webinars with stakeholders, as well as specialized webinars for Central Utah users, and peak flow forecasts webinars.

### 3rd Quarter FY2013

- **CHPS Innovations**
  - Wrapping up work with University of Colorado on weather generator to feed ESP.
  - Continue Beta testing HEFS in FEWS
- **Ensemble/Uncertainty Initiatives**
  - Developing verification statistics for Schaake post adjustment technique.
- **Forcing innovations**
  - Nothing new to report.
- **Status of ongoing and new IWRSS innovations:**
  - Nothing new to report.
- **Significant external engagement**
  - Nothing to report.



#### 4th Quarter FY2013

- **CHPS Innovations**
  - Continue Beta testing HEFS in FEWS
- **Ensemble/Uncertainty Initiatives**
  - Continue developing verification statistics for Schaake post adjustment technique.
- **Forcing innovations**
  - Nothing new to report.
- **Status of ongoing and new IWRSS innovations:**
  - Nothing new to report.
- **Significant external engagement**
  - Nothing to report.

## FY2013 AHPS Activities for CNRFC

**Management Lead:** Rob Hartman, HIC; Art Henkel, DOH; Alan Haynes SCH

**Objective:** Implement AHPS services in the California-Nevada River Forecast Center's area of responsibility.

**Milestones:**

### FY13 Planned New Service Locations

Area of Service (River Basin)	# New Locations	Location Names (LIDs)	Service Type Provided *see list below	Planned Completion Quarter	Completion Quarter	Notes

\*Service Types available: Probabilistic on AHPS web, SSHP-SAC, SSHP-API, Flood Inundation Mapping, Water Resources on Western Water web page, Probabilistic displayed only on RFC web page, Probabilistic delivered directly to partner (not on any web page)

### AHPS Service Location Summary

Time Frame	Probabilistic AHPS Web	Site Specific (SAC)	Site Specific (API)	Forecast Inundation Map	Water Resources Sites on W. Water Web Page	Probabilistic RFC Web Only	Other	Number Unique Locations
Q1	0	0	0	0	0	0	0	0
Q2	0	0	0	0	0	0	0	0
Q3	0	0	0	0	0	0	0	0
Q4	0	0	0	0	0	0	0	0
Total FY13	0	0	0	0	0	0	0	0
Overall Total (FY2000-2013)	46	0	0	0	33	94	10	183

**Accomplishments/Actions** (on each of the following topics that apply):

#### 1<sup>st</sup> Quarter FY2013

- CHPS Innovations
- Ensemble/Uncertainty Initiatives
- Forcing innovations
- Status of ongoing and new IWRSS innovations
- Significant external engagement

#### 2<sup>nd</sup> Quarter FY2013

- CHPS Innovations

- **Ensemble/Uncertainty Initiatives**
- **Forcing innovations**
- **Status of ongoing and new IWRSS innovations**
- **Significant external engagement**

**3rd Quarter FY2013**

- **CHPS Innovations**
- **Ensemble/Uncertainty Initiatives**
- **Basin recalibration**

**4<sup>nd</sup> Quarter FY2013**

- **CHPS Innovations**
- **Ensemble/Uncertainty Initiatives**
- **HEFS V1.0 implementation**
- **Basin recalibration / implementation**

## FY2013 AHPS Activities for NWRFC

**Management Lead:** Harold Opitz, HIC; Andy Wood, DOH; Joe Intermill SCH

**Objective:** Implement AHPS services in the Northwest River Forecast Center's area of responsibility.

**Milestones:**

### FY13 Planned New Service Locations

Area of Service (River Basin)	# New Locations	Location Names (LIDs)	Service Type Provided *see list below	Planned Completion Quarter	Completion Quarter	Notes

\*Service Types available: Probabilistic on AHPS web, SSHP-SAC, SSHP-API, Flood Inundation Mapping, Water Resources on Western Water web page, Probabilistic displayed only on RFC web page, Probabilistic delivered directly to partner (not on any web page)

### AHPS Service Location Summary

Time Frame	Probabilistic AHPS Web	Site Specific (SAC)	Site Specific (API)	Forecast Inundation Map	Water Resources Sites on W. Water Web Page	Probabilistic RFC Web Only	Other	Number Unique Locations
Q1	0	0	0	0	0	0	0	0
Q2	0	0	0	0	0	0	0	0
Q3	0	0	0	0	0	0	0	0
Q4	0	0	0	0	0	0	0	0
Total FY13	0	0	0	0	0	0	0	0
Overall Total (FY2000-2012)	142	0	0	1	105	20	0	0

**Accomplishments/Actions** (on each of the following topics that apply):

#### 1<sup>st</sup> Quarter FY2013

- CHPS Innovations
- Ensemble/Uncertainty Initiatives
- Forcing innovations
- Status of ongoing and new IWRSS innovations
- Significant external engagement

#### 2<sup>nd</sup> Quarter FY2013

- CHPS Innovations

- **Ensemble/Uncertainty Initiatives**
- **Forcing innovations**
- **Status of ongoing and new IWRSS innovations**
- **Significant external engagement**

**3<sup>rd</sup> Quarter FY2013**

- **CHPS Innovations**
- **Ensemble/Uncertainty Initiatives**
- **Forcing innovations**
- **Status of ongoing and new IWRSS innovations**
- **Significant external engagement**

**4<sup>th</sup> Quarter FY2013**

- **CHPS Innovations**
- **Ensemble/Uncertainty Initiatives**
- **Forcing innovations**
- **Status of ongoing and new IWRSS innovations**
- **Significant external engagement**

## **Outreach and Training**

## AHPS FY13 Hydrology Program Outreach & Training Work Plan

**Theme:** Hydrologic Services Outreach

**Management Lead:** Tom Graziano, Katie Garrett, Regional Hydrologic Services Program Representatives

**Objectives:** Accomplish outreach and training efforts with national, regional, and local partners and customers with emphasis on locations where AHPS or water resource services are being or will soon be implemented. Develop clear and consistent outreach and training materials for use by national, regional, and local personnel.

### Milestones

Tasks	Org	Cost (\$1000)	Quarter Due Date	Status
End of year outreach funds were made available to the Regions in Q4	OCWWS	42.83	4	Completed
<b>Outreach Subtotal</b>		<b>42.83</b>		
FF Operations Virtual Course (PNS HY22)	OCWWS/COMET	26.0	3	Completed
WFO Simulations (PNS HY31)	OCWWS/WDTB	106.0	4	In Progress but Behind Schedule
Hydro PDS (PNS IN29)	OCWWS/COMET	24.0	4	Completed
Flood Mapping Decision Support (PNS HY22)	OHD	-	3	Cancelled
RFC Workshop (Virtual)-Calibration (PNS HY33)	OHD/Deltares	10.0	4	In Progress
<b>Training Subtotal</b>		<b>166.0</b>		
<b>AHPS Total</b>		<b>208.83</b>		
<b>Headquarters (HSD)</b>				
Outreach Materials for use at National Conferences and local area outreach events	HQ	3.211	4	Completed
Renewal of Turn Around Don't Drown Trademark	HQ	1	4	Completed
Turn Around Don't Drown signs - to be distributed to the field.	HQ	2.108	4	Completed
<b>Outreach Sub Total</b>	HQ	<b>6.319</b>		
No training activities planned due to budget				
<b>Training Sub Total</b>	HQ	<b>0</b>		
<b>HQ Total</b>		<b>6.319</b>		
<b>Eastern Region</b>				
Coordination visits with reservoir owners in the Southeast U.S. (SERFC); Location: Carolinas	ER	0	4	Not Completed
Coordination meetings with USACE (Wilmington) and WFO offices (SERFC); Location: Carolinas	ER	0	4	Not Completed
Chesapeake Bay Region Coordination Meetings: Interstate Commission of the Potomac River and WFO Sterling, VA. (MARFC); Location: Maryland & Virginia	ER	.854	4	Completed (NCEP WPC visit added; ICPRB Cancelled)
NY/NJ Coordination Meetings: WFO Mt Holly, NJ; WFO New York, NY; Eastern Region Headquarters Bohemia, NY (MARFC); Location: New York & New Jersey	ER	1.543	4	Completed
Upper Susquehanna Watershed Coordination Meeting: WFO Binghamton, NY (MARFC); Location: Binghamton, NY	ER	.644	4	Completed
International Hydrology Meeting US/Canada (NERFC & ER HSD); Location: Burlington, VT	ER	1.798	4	Completed
Mohawk River Basin Familiarization (NERFC); Location: Central New York	ER	.505	4	Completed
Ohio River Basin Alliance Meeting (OHRFC); Location: Louisville, KY	ER	.225	4	Completed

HIC Coordination Meetings with WFO offices in the Ohio River Valley (OHRFC); Location: KY, WV, VA	ER	.328	4	Completed
Coordination Meetings with Central Region WFO offices (Paducah & Lincoln) (OHRFC); Location: KY, IL	ER	.313	4	Completed
ORSANCO Water Resources Committee Meeting (OHRFC); Location: Erlanger, KY	ER	.109	4	Completed
Coordination Meeting with NOAA GLERL (OHRFC); Location: Ann Arbor, MI	ER	.017	4	Completed
HIC Coordination Meeting with NOHRSC (OHRFC); Location: Chanhassen, MN	ER	.468	4	Completed
WFO Forecaster Visits to SERFC (AKQ, CAE, RAH); Location: Peachtree City, GA	ER	.848	4	Completed
<b>Outreach Sub Total</b>	ER	<b>7.652</b>		
No training activities planned due to budget				
<b>Training Sub Total</b>	ER	<b>0</b>		
<b>ER Total</b>		<b>7.652</b>		
<b>Southern Region</b>				
ABRFC – WFO Outreach/Training Trip Location: Pueblo, CO; Amarillo, TX; Dodge City, KS	SR	.6	4	Completed
ABRFC – USACE/WFO Visit Location: Little Rock, AR and Shreveport, LA	SR	.45	4	Completed
ABRFC – Red River Valley Authority Meeting Location: Durant, OK	SR	.18	4	Completed
ABRFC – Forecaster Familiarization Trips to Forecast Points Location: Northwest OK and KS	SR	.5	4	Reprogram
LMRFC – Coordination Meeting with USACE - St. Louis Location: St. Louis, MO	SR	.975	4	Reprogram
LMRFC – Coordination Meeting with USACE – Vicksburg and WFO JAN Location: Vicksburg, MS	SR	.975	4	Completed
LMRFC – Coordination/Job Shadowing with WFO LCH Service Hydrologist Location: Lake Charles, LA	SR	.525	4	Completed
SERFC – HEC-RAS Training Location: RFC (TBD)	SR	.7	4	Completed
SERFC – WFO SSHP Training Location: WFO TAE and WFO JAX	SR	.3	4	Completed
SERFC – MPE/Dual Pol Training Location: OHD Visit to SERFC	SR	.8	4	Completed
SERFC – MMEFS Training to WFOs Location: TBD	SR	.4	4	Completed
WGRFC – WFO Outreach/Training Trip Location: TBD	SR	2.0	4	Completed
SR HSB – WFO AHPS Program Support	SR	.095	4	Reprogram
<b>Outreach Sub Total</b>	SR	<b>8.5</b>		
No Training Activities planned due to budget				
<b>Training Sub Total</b>	SR	<b>0</b>		
<b>SR Total</b>		<b>8.5</b>		
<b>Western Region</b>				
Travel to support WFO Hanford, 3 nights	WR	.484	4	Completed
Zion NP/Zion Adventure Co, 2 nights	WR	.324	4	Completed
Grand Staircase Escalante NM, 2 nights	WR	.324	4	Completed



Goblin Valley State Park/Users, 2 nights	WR	.372	4	Completed
TADD Signs (3 locations/5 signs)	WR	.225	4	Completed
Travel to support WFO LKN (2-persons - SSH and Hydro Focal Point), 3 nights	WR	.886	4	Completed
Travel to support WFO VEF (1-person), 3-nights	WR	.826	4	Completed
Travel to support WFO SGX, 3 nights	WR	.648	4	Completed
WFO EKA travel to CNRFC - Alternative FLW Project, (2-persons - WCM and SH)	WR	.85	4	Completed
SH Outreach Trip No 1 - Russian River (1-person), 1-night, POV	WR	.420	4	Completed
SH Outreach Trip No 3 - San Rafael (1-person), 1-night, POV	WR	.361	4	Completed
SH Outreach Trip No 4, Contra Costa County (1-person), 1-night, POV	WR	.388	4	Completed
Travel to support WFO GGW (1-person), 2-nights	WR	.282	4	Completed
Travel to support WFO BYZ (1-person), 2-nights	WR	.284	4	Completed
EM and Flood Stage Visits, Havre Area, (1-person), 1-night	WR	.152	4	Completed
EM, Flood Stage Visits, and FF Prone Areas, Dillon Area, (1-person), 2-nights	WR	.280	4	Completed
TADD Signs (2 locations/4 signs)	WR	.217	4	Completed
Travel to support WFO Flagstaff, (1-person), 1-night	WR	.206	4	Completed
Flood Stage Visits (Trip 3) - Great Falls	WR	.186	4	Completed
Eureka Intern Visit to CNRFC	WR	.375	4	Completed
6 More TADD Signs	WR	.267	4	Completed
<b>Outreach Sub Total</b>	WR	<b>8.36</b>		
No Training Activities planned due to budget				
<b>Training Sub Total</b>	WR	<b>0</b>		
<b>WR Total</b>		<b>8.36</b>		
<b>Alaska/Pacific Regions</b>				
SCH Lindsey to Fairbanks/UAF and FAI WFO for outreach to user community, coordination of R2O projects, and training at the WFO	AR	.557	4	Completed
SSH Plumb from FAI WFO to APRFC for HPM meeting- discuss collaborations, future AHPS enhancements, field program	AR	.895	4	Completed
SSH Jacobs from JNU WFO to APRFC for HPM meeting- discuss collaborations, future AHPS enhancements, field program	AR	.598	4	Completed
DOH Streubel to HNL WFO to provide training in Kauai model and plan for expansion to other islands	AR	1.947	4	Completed
<b>Outreach Sub Total</b>	AR	<b>3.997</b>		
No Training Activities planned due to budget				
<b>Training Sub Total</b>	AR	<b>0</b>		
<b>AR/PR Total</b>		<b>3.997</b>		
<b>Central Region</b>				
MBRFC WFO visits to NE WFOs (OAX, GID, LBF)	CR	1.5	4	Completed
NCRFC WFO visits (LOT, ARX, and DMX)	CR	1.5	4	Completed
MBRFC workshop (OAX, GLD, DDC, BIS)	CR	2.4	4	Completed
NCRFC workshop (DMX, DLH, DVN, LOT, MQT)	CR	2.0	4	Completed
IND and JKL forecaster visit to OHRFC	CR	0.4	4	Completed
SGF SH and two ICT forecasters visits to ABRFC	CR	0.7	4	Completed
FUSION team funding –repurposed for NCRFC forecaster Souris River familiarization trip and MBRFC Steve Predmore for WFO visits	CR	1.5	4	Completed
<b>Outreach Sub Total</b>	CR	<b>10</b>		
No Training Activities Planned due to budget				

Training Sub Total	CR	0		
CR Total		10		

### Accomplishments/Actions

1<sup>st</sup> Quarter FY13

2<sup>nd</sup> Quarter FY13

- The completed Hydrologic Professional Development Series (PDS) 1 is available online in the Training Portal at: <http://www.nws.noaa.gov/training/hydrologyPDS.php>

3<sup>rd</sup> Quarter FY13

- From April 9<sup>th</sup>-11<sup>th</sup>, 66 individuals attended all six sessions of the Flash Flood Operations virtual course, with many others attending specific sessions related to their interests. Adjustments were made to the course in light of the budget/travel constraints. These adjustments were largely well received by the participants.

4<sup>th</sup> Quarter FY13

- All 3 sections of the Hydro PDS were completed.
- Deltares was able to begin work on the calibration training.
- Each region was provided end of year AHPS funds to use for outreach.
- Headquarters was also provided end of year AHPS funds to use for outreach.

### Problems Encountered/Issues

1<sup>st</sup> Quarter FY13

2<sup>nd</sup> Quarter FY13

- Due to on-going budget constraints a number of projects have been delayed or put on-hold indefinitely.

3<sup>rd</sup> Quarter FY13

- Due to on-going budget constraints a number of projects have been delayed or put on-hold indefinitely.

4<sup>th</sup> Quarter FY13

- Simulation training is now behind schedule.
- Flood Mapping Decision Support Training canceled due to budget constraints.

## **Program Management**

## Program Management

**Theme:** Program Management

**Management Lead:** Donna Page

**Objective:** Provide national program management; coordinate and track AHPS budgets and project plans; manage AHPS contracts; and foster Agency, Departmental, and Legislative Interface.

### Milestones

Tasks/Subtask FY13 Milestones	Responsible	FY13 Quarter Completion Date
OHD Portfolio Definition	OHD	Q4
AHPS Planning/ Execution/ Reporting <ul style="list-style-type: none"> <li>E-CPIC Updates</li> <li>Monthly Status for NWS Monthly Report</li> <li>Quarterly Status Report</li> </ul>	OHD OHD OHD/Regions	Quarterly Monthly Quarterly
NOAA SEE Hydrology Program Support <ul style="list-style-type: none"> <li>Program Operating Plan</li> <li>Quarterly Program Review</li> </ul>	OHD OHD	3 <sup>rd</sup> Quarterly
Agency/ Department/ Legislative Interfaces <ul style="list-style-type: none"> <li>Budget Fact Sheet</li> <li>Prepare and submit Budget Request</li> <li>Prepare Briefings and Support OMB/Congressional Meetings</li> <li>Prepare Response to Pass Back</li> <li>Prepare Response to Budget Hearing Questions</li> </ul>	OHD OHD OHD  OHD OHD	1 <sup>st</sup> 2 <sup>nd</sup> 3 <sup>rd</sup>  3 <sup>rd</sup> 4 <sup>th</sup>
NWS Requirements and Development Processes <ul style="list-style-type: none"> <li>OSIP review team and gate meetings</li> <li>AWIPS SREC</li> </ul>	OHD OHD	Weekly (as needed) Biweekly

### Accomplishments/Actions

#### 1<sup>st</sup> Quarter FY13

- All milestones are on schedule – all scheduled reports completed
- Congress passed a Continuing Resolution (CR) to last until March 27, 2013. Funding severely limited through the CR period.
- OHD consolidated most of their operations to the 8<sup>th</sup> floor of SSMC2. Only maintain small part of AWIPS testbed area on 7<sup>th</sup> floor.
- All AHPS project management is being handled by government FTE - Quarterly AHPS reports are being compiled by Dennis Miller. Other reporting handled by other government FTE.

#### 2<sup>nd</sup> Quarter FY13

- All milestones are on schedule – all scheduled reports completed
- The FY13 Continuing Resolution (CR) was in place until final CR was passed for remaining of FY13 (March 26). Funding severely limited through the CR period.
- OHD worked on reconciling property inventory (completed) and excessing property from the remaining 7<sup>th</sup> floor store room.
- All AHPS project management is being handled by government FTE - Quarterly AHPS reports are being compiled by Dennis Miller. Other reporting handled by other government FTE.
- OHD starting to work with teams focused on restructuring of NWS budget into 5 main activities (Observations; Central Processing; Analyze, Forecast, Support; Dissemination; Science and Technology Integration)

### **3<sup>rd</sup> Quarter FY13**

- First installment of AHPS funding was received in Q3. Spend plan was developed for “regular” AHPS funding. Plan for the “plus up” funds will be finalized in Q4 when funds are available.
- Reduced projected number of AHPS locations from 379 to 85 for FY13. That was all the RFCs committed to for FY13.
- Gathered feedback on Water Resources Forecast Improvement Preparatory Project report. Began working on team charters and soliciting interest in the teams from Region, HIC and HQ management staff.
- National Water Center staffing and operations plan (report to Congress) drafted and sent to NWS
- All other scheduled reports completed.

### **4<sup>th</sup> Quarter FY13**

- All AHPS funding was received. Plans were put in place and executed for “regular” and “plus up” AHPS funding.
- Completed target number of 85 AHPS locations for FY13. End of FY13 total is 3343 AHPS locations.
- Coordinated with CFO on plans for remaining 668 locations. Committed to complete 167/year for next 4 years (FY14-FY17).
- Chartered 5 WFIPP teams (RFC Archive, Evaluation and Verification, Modeling Testbed, Integrated Information, and RFC Service Backup). Teams started work in September and will report out in January 2014.
- National Water Center staffing and operations plan (report to Congress) cleared NWS, NOAA, DOC, OMB.
- All other scheduled reports completed.

## **Problems Encountered/Issues**

### **1<sup>st</sup> Quarter FY13**

- NOAA dealing with effects of operating under a CR and the threat of sequestration. Funding allocation to OHD has been greatly reduced to a little more than labor. There are no AHPS funds allotted in Q1.

### **2<sup>nd</sup> Quarter FY13**

- NOAA still dealing with effects of operating under a CR and the threat of sequestration. Funding allocation to OHD has been greatly reduced to a little more than labor. There were no AHPS funds allotted in Q1 or Q2.

### **3<sup>rd</sup> Quarter FY13**

- Some contracting delays.

### **4<sup>th</sup> Quarter FY13**

- Planning for potential shutdown.